

COST KEEPING *and* **CONSTRUCTION ACCOUNTING**

SECOND EDITION

OCTOBER 1919



By G. ED ROSS

Associate Member Northwest Society Highway Engineers

FORMERLY

Secretary and Auditor Oregon State Highway Department



Class TV

Book 1

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Cost Keeping *and* Construction Accounting

(Second Edition)

By G. E. D. ROSS

Associate Member Northwest Society Highway Engineers

Assistant Secretary, Chief Accountant and Cost Keeper
THE PHEZ COMPANY, Salem, Oregon

Adapted to any work consisting of numerous items,
departments or divisions on which detailed
unit costs are desired.

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SALEM - - - OREGON

All manner of construction enterprises come under this
head, such as Irrigation, Highway, Railroad, Ship-
building and Municipal Improvement. It is
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Secretary and Auditor, Oregon State Highway Commission,
Salem, Oregon.

Traveling Accountant, Construction Division, War Department,
Washington, D. C.

(This Covers a Period of Twelve Years)

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*Very truly yours,
L. Ed Ross.*

WAR DEPARTMENT
OFFICE OF THE CONSTRUCTION DIVISION OF THE ARMY
WASHINGTON, D. C.

December 31, 1918

George E. Ross:

On your retirement today from service in the Construction Division of the Army, I desire to express my appreciation of the credible assistance rendered by you in helping win the War.

The spirit of Loyalty, Co-operation and intelligent effort which characterized your service in the Construction Division, is one of the instruments by which the successful prosecution of its great work has been made possible.

I congratulate you on the part you have taken in the Nation's record of accomplishment and extend to you my cordial and sincere good wishes.

R. C. Marshall, Jr.,

Brigadier General U. S. A.,
Chief of Construction Division.

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Preface

For a number of years the writer has been especially interested in cost accounting matters. On coming to the Pacific Coast country excellent opportunity was offered on heavy construction work for development along the line of his natural inclination. About 1908 he started to work out a simple but comprehensive system of accounts for construction work. Costkeeping records with general office records were combined, using field records so far as practicable as a part of the permanent record. This was intended to fit the accounting requirements of the average contractor who did not feel justified in going to much expense for accounting work. Fortunately conditions were such for two years as to make it possible to spend the entire construction season each year in the camps with the men, and to associate continuously and intimately with them. While in charge of the entire accounting work on projects for a number of years, the writer has endeavored to spend as much time as possible in the field, and confesses that close association with practical field construction men has materially changed and broadened his views on construction accounting. Development on this original outline continued several years until in the spring of 1913 an opportunity presented itself to try the system complete on the construction of the Tumalo Irrigation Project, near Bend, in Central Oregon.

The simplicity of the methods used and the comprehensive manner in which cost and general office records were made available, together with the low cost of operation caused considerable favorable comment throughout the Pacific States, especially from sections interested in irrigation construction. The success on this work secured for the writer an appointment as Secretary and Auditor of the Oregon State Highway Department at Salem, to install and operate this system of costkeeping and general office accounting. Road construction accounting problems differed somewhat from those on irrigation construction, but in the main the principles encountered were much the same. Some of the forms used on the Tumalo Project were adopted without change; others were modified, and a few entirely new ones were found necessary.

Articles in the Engineering Record, published in New York City, under date of June 24, 1916, and Western Engineering, published in San Francisco, outlining the method of costkeeping and accounting used by the Oregon State Highway Commission, resulted in a great many inquiries from all over the country, for more detailed information, forms, etc.

In December, 1916, under direction of the State Engineer, there was prepared State Highway Bulletin No. 2, on "Costkeeping and Accounting." This Bulletin consisted of 60 pages and described, in a general manner, our methods and forms. A thousand of these bulletins were printed. They, however, supplied only a portion of the requests from all sections of the country. In January

1917 the first edition of "Costkeeping and Construction Accounting" was issued. Orders came from all parts of the United States and Canada; also from Europe, Asia, South America, Greenland, and many other places, calling forth many favorable comments as to the practicability and possibilities of the methods outlined.

During 1917 and 1918 the road program in Oregon was greatly enlarged, and aggregated a fund in excess of \$10,000,000, counting Government co-operative funds, county co-operative funds, state taxes and bond issue funds, which were made available for expenditure under direction of State Highway Department. This expansion tested the elasticity of the system in a very practical manner. Its fitness for the larger program was readily proven.

In 1918 the writer secured a leave of absence to serve in the Construction Division of the Army; reporting at Washington, D. C. His work took him over a large number of the cantonments in the Eastern, Middle Western, Southern, and Southwestern states, where ample opportunity was given to inspect methods of handling construction accounting problems on exceedingly heavy emergency work. Some of the country's largest and best equipped contracting companies were employed on these projects.

Next to his desire to be "in" on the war game, and serve his country in its time of trouble, the writer's object in going East was that he might improve the opportunity offered during those times to become familiar with the methods of construction accounting in general use. His investi-

gations were made with an open mind as he wished to learn and broaden his own knowledge along the lines of his chosen profession. A great deal of overtime service was given Uncle Sam in order to go thoroughly into these matters.

On his return to the Pacific Coast he was more firmly convinced than ever that accounting practices followed in the West were producing results equal to any in use elsewhere and that we were getting at the matter of costs from quite a different angle. It is believed we are securing greater segregation with fewer and smaller forms and using more conveniently handled books than was the case with the systems which the writer investigated on Government construction work. Hence this publication.

The author wishes to acknowledge indebtedness, and express his appreciation to a host of associates who have been responsible for the favorable results secured on construction projects by methods outlined herein.

This system of accounting is still far short of its possibilities both in construction and commercial work. The author invites and will thoroughly appreciate criticism as to methods outlined and suggestions for improvement which may assist in making it better adapted to handling of general construction accounting problems.

Each project will find problems which require an intimate personal knowledge of all local conditions before they may be intelligently solved.

THE AUTHOR.

Salem, Oregon, September 5, 1919.

Practical Opinions by Practical Men

On the Merits of the Numerical Method of Cost Keeping and Accounting and of the Author's General Standing and Success With This System on Large Projects

The object of the insertion of the following comments in a book of this nature is to encourage the study of the book, instead of simply the reading of it. The arrangement of the book and much labor in its compilation have been with the hope that it might be useful to those into whose hands it fell. Sometimes a book is superficially read, and from the fact that nothing of interest immediately catches the eye of the reader, it is thrown aside and little of practical value comes from its ownership. In an attempt to save this publication from that fate, in as great measure as possible, the statements of prominent men have been recorded. They consider the methods outlined and the contents of the book worthy of comment, at least, and if the person interested in construction accounting does not at first glance find something of interest and value, perhaps the statements of these gentlemen will induce him to study the book a little more closely. If this publication falls short of being a real Practical Service Book, it has not accomplished what the author earnestly hopes of it.

(These statements refer to first edition of Cost Keeping and Construction Accounting. This edition is larger and of a more general nature than the first volume).

A Staunch Friend of the Arid West

"I have taken the book with me on one of my trips in order to read it over. Had we been in possession of something of this kind when the Reclamation Service started, we could have saved great sums of money and much unnecessary worry."—**Dr. F. H. Newell, President American Association of Engineers, formerly Director of the United States Reclamation Service (University of Illinois, Urbana, Ill.)**

Uncle Sam's Great Road Building Department Interested

"This office has been investigating the subject of cost-keeping for road work for some time, and I fully realize the amount of thought and hard work your bulletin represents. I assure you that we have received considerable assistance in our cost work both from your bulletin and your letters."—**L. W. Page, late Director of the United States Bureau of Public Roads and Rural Engineering, Washington, D. C. (Above letter written in 1917).**

After Several Weeks Careful and Critical Investigation

"From an examination of the method of costkeeping and the handling of accounts, we wish to state that in our opinion, the system as now in operation under the supervision of Herbert Nunn, State Highway Engineer, and G. Ed Ross, Secretary and Auditor, is one of the most perfect that we have ever had the pleasure of auditing."—**Extract from a report to the State Highway Commission by Crandall & Roberts, Certified Public Accountants, Portland, Oregon, Dated March 12, 1918.**

To Be Used in the Course of an Ohio University

"I have studied this little book with care and find in it the most concise, and at the same time usable material on this subject that has yet come to my attention. I shall find use for it in my course in Highway Engineering."—**John J. Long, Assistant Professor of Civil Engineering, University of Cincinnati.**

An Authority on Water Power and Irrigation Projects

"The people of Oregon are indebted to G. Ed Ross, auditor and accountant in the State Highway Department, for developing the details of this system. He was selected for this position because he has devoted his life to this class of accounting work. Prior to his appointment he was employed by the state in construction of the Tumalo Irrigation Project and later in the state's department of Accountancy. I wish to acknowledge the loyalty, faithfulness and zeal with which he has handled the work entrusted to him."—**John H. Lewis, State Engineer. Salem, Oregon, December 10, 1916.**

Cost Engineer Construction Division

War Department Comments

"Believe the method of numbering and segregating accounts, laid down in your book, is one of the most simple and efficacious that can be devised. Your notes and the detail given in explanation of the methods are brief and to the point. The forms are practical and readily understood. * * I see absolutely no reason why it is not applicable to any business where costs have to be kept."—**Joseph Weare, Cost Engineer, Construction Division, War Department, 7th and B Streets, Washington, D. C.**

Portland's Prominent and Active City Engineer

"I am well acquainted with G. Ed Ross and his system of 'Cost Keeping and Construction Accounting.' His system was installed on the Tumalo Irrigation Project (Central Oregon) and was used by the State of Oregon on this project under my charge during the years 1913 and 1914 with remarkable success. I consider the system of cost keeping and construction accounting as devised and established by Mr. Ross to be the most perfect, simple and effective for practical results on all kinds of construction, that could be used."—**O. Laurgaard, City Engineer, Portland, Oregon. President Oregon State Board for the Examining of Engineers.**

Oregon's Present State Highway Engineer

"Mr. Ross is responsible for the installation of a cost accounting system in the Highway Department (Oregon) that has caused favorable comment throughout the United States. * * * I have never known a man who had a greater capacity for work, and he is thorough, painstaking and conscientious. * * * His moral habits are of the best and his character excellent. This Department sees the departure of Mr. Ross with the greatest regret."—**Herbert Nunn, State Highway Engineer of Oregon.**

The Author's "Post Graduate Course" in Construction Accounting. Government Cantonments Were Visited in the Middle Western, Eastern, Southern and Southwestern States

"Before leaving the service of the Construction Division (War Department) I desire to express to you my sincere appreciation for the efficient and loyal service you have rendered as a member of the organization of this section.

"As a representative of the Washington Office, visiting the construction projects in the field, you have come directly in contact with the difficult accounting problems encountered by the Field Auditor and his staff, and through your ability to analyze the essential points and your determination in sticking to the problems until they were successfully solved, you have been able to render a real service for which you deserve high commendation. For any degree of success which this Department has merited you are in a large measure responsible. You have always shown the keenest interest in your work and have been loyal and patriotic at all times. * * *"—**Major L. J. Kelly, Chief of Traveling Accountants, Construction Division of the Army, Washington, D. C., July 14, 1919.**

Editorial Comment

"Mr. G. Ed Ross has contributed an article in this issue that should go far toward elucidating the principle of cost-keeping and render easy the development of a system applicable to highway construction and other kinds of engineering work. In this connection it is interesting to note, that since the article went to press, we have received word of a number of counties in Oregon which are preparing to install Mr. Ross' system, with the object in view of having all highway records uniform throughout the state."—**Editorial "Western Engineering," San Francisco, April 1916.**

Comments By Oregon's Present Governor

"I know him (G. Ed Ross) to be a young man of ability, integrity and character. * * * He has been in the employ

of the State of Oregon in various capacities and has always made good. * * As our office is the auditing office of the state, we have been brought into close touch with Mr. Ross and know intimately of his work with the Commission (State Highway Commission) and of his high standing with them. * * Mr. Ross' standing in this community is of the highest and he is entitled to the fullest confidence and respect of all."—**Hon. Ben W. Olcott, Governor of the State of Oregon.** (At time above statement made in July 1918, Mr. Olcott was Secretary of State).

Oregon's Grand Old Man—A Special Friend of All Young People

"I have been familiar with Mr. Ross' work for a number of years and have a very high regard for him as a man of unquestioned integrity and one who is always industrious and reliable. He is thoroughly efficient in his work and has my unqualified endorsement for any position of trust and responsibility that he may see fit to aspire towards."—**Hon. James Withycombe, Late Governor of Oregon.**

Oregon's "Prison Reform" and "Bone Dry" Governor Gives His Endorsement

"I am pleased to say that Mr. Ross' system of accounting proved satisfactory in every particular and enabled us to keep in close touch with the progress of the work (on Tumalo Irrigation Project) and know at all times just how, when and where every penny of the state's money was being expended, and it gives me pleasure to add my unqualified endorsement to his system of accounting and commend it to those who may have in mind the adoption of new methods."—**Hon. Oswald West, Governor of Oregon 1911 to 1915.**

Applicable to All Sized Projects

"The system outlined is believed to fit the needs of today in road building. It is sufficiently elastic in its operation to be applicable to the smallest as well as the largest unit or project."—**Statement on Editorial Page "Concrete Highway Magazine," Chicago, under date of January 1917.**

A Consulting Engineer's Opinion

"Having had an opportunity to make more than a superficial study of the book, I wish to say that expressions of the author's ability and thorough understanding of the subject, may be observed throughout the publication."—**Howard W. Holmes, Designing and Consulting Engineer Bridges and Structures, Highway Improvements and Pavements, Portland, Oregon.**

A Former Engineer Lackawana Railroad System in New Jersey

"We have given your cost number system a fair, honest tryout. I like it very much. Simple, comprehensive data is there available when wanted. It is a systematic method of preserving construction records which can be handled by any intelligent man understanding what cost data is wanted, and simple methods of timekeeping."—**E. I. Cantine, formerly State Highway Engineer of Oregon.**

Used With Lecture Course Oregon Agricultural College

"We are using this book in connection with the Lecture Course on Economics of Highway Construction, and find it of value. I am also using a modified form of this method in keeping the costs on my campus improvements, and find it very convenient."—**Gordon V. Skelton, Professor Highway Engineering, Oregon State Agricultural College.**

Even Russia Was Going to Try It When Czars Still Existed

"The book I presume will save much money as it is applicable to all works and conditions and can be used successfully in Russia."—**John S. Zubkon, (Agent for the Russian Government).** Letter dated August 29, 1917, P. O. Box 115, Hazleton, Pa.

A County Surveyor Uses the System in Road Districts

"I wish to say that I am immensely pleased with the way the cost keeping system is working out."—**Hollis W. Libby, County Surveyor, Lane County, Oregon.**

The "Big City" Is Interested

"There is no book in our great city which gives the information which is contained in your copy."—**P. S. Kaufman, care of De Garcey Company, New York City, August 3, 1919.**

The Locator, Designer and Engineer on the Construction of the Famous "Mitchell Point Tunnel" on the Columbia River Highway Has Used This System for Years

"Personally I have seen tried and used myself several other systems but do not hesitate to say that your system gives all the required results with the minimum amount of work. I have used your system on location surveys, on day labor jobs and contract work, and find it equally applicable to all classes of work."—**J. A. Elliott, Senior Highway Engineer, United States Bureau of Public Roads. In charge of Forest Road construction, Portland, Oregon.**

It Suits the Practical Superintendent

"There is no lost motion or red tape in this entire system of accounting."—**Axel M. Bye, formerly Superintendent of Construction U. S. Reclamation Service, Arizona and Yakima Valley, and later for the Guggenheim Company in Chile.**

When Trouble Starts There is Need of Definite Cost Figures

"Public officials are beginning to realize the importance of being able to face their constituents with tangible facts when the question of judicious expenditures arises, as it very frequently does on public work.

Introduction

Cost keeping should start with the first survey on highway work and be a comprehensive continuous record, by distinct features, to completion of construction. Maintenance cost records are then started and continue from year to year. Proper cost records are nothing more or less than historical facts, which if intelligently compiled, form the basis on which the history of the project is built.

Uniformity in construction accounting is possible only to the extent of adoption of a theory or principle sufficiently elastic to be adaptable to a wide range of varying conditions, suitable for the largest, as well as the smallest construction enterprise. The method of procedure is then uniform, and the data gathered will be uniform to the point of similarity of conditions on the various projects, or units of projects.

The divisions on the average construction job to insure proper supervision of the forces employed, are the logical units for cost records, and when segregated in this manner, it matters little whether the cost of the project is a few thousand dollars or millions—the principle involved and method of securing data by units are identical.

If the division happens to be a gang of 50 men on earth excavation, accomplishments per man per day, week or month may be compared item by item with a rival gang of 165 men, or another with

200 men, all doing similar work. All the items on different features may not necessarily be identical, if a sufficient number are similar to make possible a fair comparison of the relative degrees of efficiency. By this comparison the accomplishment per man as well as the weak points of the less efficient gangs are apparent. It will also determine to some extent whether or not large crews are handled economically, from the standpoint of accomplishments per man, as compared with smaller gangs. The man day performance test frequently results in surprises as to the real values of foremen and superintendents, as well as those in less important positions.

With this definite record at hand, those who are not accomplishing an average day's work may be detected and either speeded up or dropped. When men are graded and rewarded by a fair test of efficiency, increased effort and results are invariably assured.

Many of the items of cost develop with the work. The washing out of false work and piers on bridge construction, earth slides on road construction, and emergencies of like nature are always possible. For this reason it is practically impossible to determine in advance, in just what form the final statement of costs will be desired. Considerable detail is, therefore, necessary, and by keeping the data in small items during the construction period, it may be finally assembled in most any form.

As supporting narrative for charges against the various account numbers, and for historical purposes, the cost keeper should have a carefully kept

diary covering all important events during construction.

The numerical system of costkeeping and accounting is adaptable to any work consisting of numerous items, departments or divisions, on which detailed unit costs are desired. It is simple in its operation, after once the principle is thoroughly understood, and is intended to meet all emergencies that arise on construction work. Costs on divisions are assembled in such form that it may be known at all times just what units are within the estimated cost, and those running higher on which special study is required. The forms necessary in its operation are few and inexpensive.

It is not expected, however, that this method of costkeeping can be properly installed after merely reading this outline. There are many difficulties to overcome in gathering reliable cost data, which require the exercising of judgment and experience in this special line of work.

Every expense on a project is taken care of by this method, and every feature bears its share of administrative expense. When the books are finally closed the total of the cost ledger features together with the appraised value of equipment and supplies left, should balance with the gross expenditures on the project.

If, from the outline herein, the system appears otherwise than simple, the difficulty lies in ability to properly describe its operation, rather than in the system itself.

Cost Accounting

FUNDAMENTAL REQUIREMENTS

Cost-keeping an Interesting Study

When entered into with the proper spirit and a system of accounting which makes possible definite and effective results, construction costkeeping becomes a most fascinating study. There is that constant change and growing to completion of something tangible which is found in scarcely any other branch of accounting. The duties of the cost-keeper on the larger projects are such as to require him to be in very close touch with every detail of the work and about as busy a man as can be found on the job. Congenial labor and plenty to do is usually productive of a "contented mind," which an old proverb tells us "is riches untold."

Superintendent Should Have Daily Costs

A costkeeping system which does not provide for frequent rendering of detailed unit costs on all features of the work during the course of construction is a back number and of little practical value. When new work is started a summary of labor costs on part of the features should be taken, possibly every evening. On an ordinary job this takes the timekeeper but a few minutes. By counting the wagon loads, fresno, slip and wheeler trips for a given period, or other means sufficiently accurate for estimating purposes, the superintendent has a method of getting at the

yardage each day. With a daily summary of charges against all features he knows, while the work is active, about how the costs are running. If they appear excessive he can give that particular unit his immediate attention. From his office he can frequently locate the trouble in a fairly definite manner. It is this feature of the system which is considered of greatest practical value, inasmuch as, when properly handled, it greatly increases the efficiency of the superintendent and his foremen and makes real money for the management through the medium of lower unit costs and greater accomplishments per gang.

Up-to-Date Accounting a Live Issue

A few years back accounting was looked upon as a sort of necessary evil and dead expense. The sales department in the up-to-date commercial business is no more effective in its functions of preserving and stimulating the "life of trade" and no more necessary than a proper method of accounting on construction projects when placed in proper relationship to the work. It certainly is a barometer on every activity, and, if in its operation it retains its position as "pace setter" for the organization, must show a little more speed than the speediest superintendent or foreman. In this age of close competition and advanced methods, when the element of guess work on construction estimates is practically eliminated, the accounting system which is only at home in the rear of the procession and gives costs only after the work is completed is of little value. Accuracy of results at a minimum cost for operation is the primary

object of the numerical system of accounting presented on these pages.

Accounts Require Special Treatment

Construction accounts, from their very nature, require different treatment than that given most other classes of accounts if necessary results are to be accomplished. The accountant should not only be able to compile a record of all transactions, but to have this in such form that the items making up the cost of a piece of work give an intelligent and reliable basis on which to estimate other work.

Duties of Timekeepers Numerous

An important fact which should not be overlooked is that usually timekeepers and men handling clerical matters on construction work are engaged a large part of the day with various other duties which are frequently of such importance that the time spent on costkeeping and accounts is considered as a side issue. If the system of accounting employed is intricate and topheavy with detail it encourages guesswork and carelessly kept records, which, at the close of the job, will be found inadequate and incomplete and of very little value either as a basis for the cost of that work which they are intended to cover or the working out of estimates on future jobs of a similar nature. It therefore stands to reason that the more simple an accounting system is in its operation, if it has the essentials, the more accurate and workable the cost data will be when finally compiled.

Essentials of Cost Systems

The essentials for a practicable accounting system for construction work should embody the following features:

An Accurate Record

1. An accurate record of all obligations as they are made is necessary that the state of finances may be known at any time with a minimum of uncertainty.

Daily Detailed Costs

2. Individual items of cost of structures on sections of work should be kept in such detail and be available at such frequent intervals as to give the superintendent an opportunity of checking and eliminating exorbitant costs from day to day while the work is in actual progress.

Supporting Narrative

3. There is needed sufficient detail in items of cost, with supporting narrative as to conditions prevalent at the time of the work and locality in which it is done, as will make it possible on future work having some elements of similarity to safely base estimates upon these costs.

Avoid Unnecessary Duplication

4. Every original entry, so far as possible, should be embodied as a portion of the permanent record, thus doing away with unnecessary copying and excessive clerical work.

Cost Records Tie Into General Accounting System

5. All cost-keeping records must tie in and be a part of other office records kept, and balance with gross expenditures on the entire work.

Friendly Rivalry Increases Efficiency

6. On each gang's work there must be a check which will show its comparative accomplishments daily, weekly or monthly. This will create enthusiasm and friendly rivalry among foremen, resulting in more efficiency and lower unit costs.

Few Books and Forms Required

7. There should be as few books and forms of record as possible to accomplish these results in the most simple and effective manner with a view of making permanent as many of the original records as practicable.

Special Men to Handle

8. Men operating this accounting system should have ordinary "horse sense" and sufficient judgment to grasp the essential features of construction work on which unit costs are desirable, and may be of value later as well as at time of construction, rather than men who are interested in the clerical work from a clerical standpoint only. This class of men is to be found on most construction work. All that is required to make them valuable assistants is a man at their head who is thoroughly familiar with construction accounting and costkeeping, and also has sufficient knowledge of general office and accounting requirements to instruct his field assistants intelligently as to just what records to keep and how to keep them.

Preparation Account Number Book

After a tentative program of the work on the prospective project is disposed of, the account

number book should be prepared. The nature of the items of the account number book will vary with the ideas of those managing the work. Some desire costs worked out to the finest detail, while others are only particular as to the total costs of features.

The Cost Man, however, in making up the account number book, should be guided largely by the fact that during construction and on completion of the work, he will be asked for numerous items of cost that were never thought of at the beginning. In making up the features, and the account numbers he should consult freely with the engineers and construction men to get a good range of their ideas on the manner in which cost data is to be called for. He should then provide a segregation of items that will enable him to supply practically any cost of features or portions of features constructed. This will also require frequently added numbers during the progress of construction, for which blank spaces are provided. The detail into which the units are to be segregated depends largely on the opinions of the men in charge of the work. It has been the writer's experience that few construction men can or will announce in advance just how much detail they are going to require. Another factor in this connection is that it is extremely difficult to look ahead on the average construction job and foretell what conditions are to be faced. The manner of securing costs should be of such nature that it may be quickly expanded to include cost data caused by emergencies and should be sufficiently in detail to give the construction men practically

any information they may ask for at any time. This will require considerable detail, especially if the project is large. If a very small project, or the work is practically the same on each section, then it is probable very little segregation is required. Whether a feature is to contain 90 numbers or only 15 and the items desired depends entirely on the judgment of the men in charge of the work. The numbers following are quite fine and will undoubtedly be considered so by many. They may be easily grouped and one number cover several items. We find in work on the Pacific Coast many good reasons for a detailed segregation and but little extra work is necessary to carry the cost data along the lines outlined herewith.

Great care should be taken to avoid apparent conflict in items of the various features.

PREFIXES

Oregon has thirty-six counties. These are numbered consecutively and the numbers used as root prefixes. Each root prefix is followed by a letter to indicate the individual project. The root prefix identifies the project as to county and the letter identifies it exactly as to location in the county, name, nature of construction, cost, name of contractor, dates of beginning and completion, engineer in charge, source of funds, and all data of like nature for permanent and definite record of work accomplished.

The counties are considered as the most desirable unit in state highway work for the reason that much of the work in this state is done in conjunction with the various counties. This proved to be a very good segregation.

Some work which extends over several counties is given special prefix numbers and on this work the county unit is ignored, except that on completion of the work the proper charges are prorated to the various counties benefitted and through which the improvement passes.

On bridge and culvert work each structure is numbered beginning with the number 51. (By beginning with No. 51 as a prefix and continuing upward, the prefixes for bridge and culvert work do not conflict with the general prefixes.)

GENERAL ROOT PREFIXES

1 Baker	13 Harney	25 Morrow
2 Benton	14 Hood River	26 Multnomah
3 Clackamas	15 Jackson	27 Polk
4 Clatsop	16 Jefferson	28 Sherman
5 Columbia	17 Josephine	29 Tillamook
6 Coos	18 Klamath	30 Umatilla
7 Crook	19 Lake	31 Union
8 Curry	20 Lane	32 Wallowa
9 Deschutes	21 Lincoln	33 Wasco
10 Douglas	22 Linn	34 Washington
11 Gilliam	23 Malheur	35 Wheeler
12 Grant	24 Marion	36 Yamhill

SPECIAL PREFIX NUMBERS

- 37 Administrative—General
- 38 Administrative—Bridge Department
- 39 Administrative—Auditing Department
- 40 Administrative—Miscellaneous Funds
- 41 General State Reconnaissance Surveys. (All Counties in State)
- 42 Surveys Eugene to Marshfield, via Florence. (Lane and Coos Counties)
- 43 Surveys Myrtle Creek to Roseburg. (Douglas and Coos Counties)
- 44 Surveys La Grande to Pendleton. (Union and Umatilla Counties)

(Note.—Prefixes 37, 38 and 39 are used only when it is desired to carry certain charges on construction in the regular construction features against administrative. Such as general tests, which may be made on one particular project for the benefit of all the work in the state. This increase in cost, if it results in such, should not be charged against the project selected as a fit one to which to apply the test, and therefore the regular items in the feature are used to denote the particular class of work covered by the experiment and the prefix placing the expense in the administrative department, either general, bridge or auditing department. These prefixes are seldom used.)

As an example of how the work is indexed and the prefixes created—will take the work in Douglas as an example. Douglas, it will be noted, carries the General Root Prefix No. 10.

10. General charges prorated to all state (or state and county co-operative) projects in county. (This means such charges as are assessed against the work in Douglas in general, which cannot be intelligently prorated or segregated against one project. An inspection trip by the state highway engineer over all the work in Douglas county would come under this head.)

10a. All preliminary and location survey work on Pacific Highway, from Roseburg south to county line. 80 per cent state funds, 20 per cent county. Work started July 15, 1919. Estimated cost \$2,475.00. James Harris, engineer.

10b. All preliminary and location work on Pacific Highway, Roseburg, north to county line. 50 per cent state funds, 50 per cent county. Work started August 10, 1919. Estimated cost \$13,172.00. (Farmer's Union to make up deficit if this sum is not sufficient.) Clinton Jones, engineer.

10c. Construction work on Pacific Highway near Comstock. Stations 1 to 512. Line brought to grade and macadamized. 50 per cent state funds, 50 per cent federal. Post Road Project. Work started May 15, under contract No. 75, with the Northwest Construction Company, of Eugene. Estimated cost \$72,500. James Madison, engineer.

10d. Construction work on Glendale Hill, Pacific Highway—stations 985 to 1010. Fourteen foot earth roadway on grade line. Funds all state. Work done under straight force account by state. Estimated cost \$12,200. Started work September 8, 1919. Should complete within 60 days of good working weather. Julius Peterson, superintendent of construction. Henry L. Newport, engineer.

10e. Hard surfacing with concrete, Pacific Highway Stations 872 to 981 beginning one mile north of Glendale. Contract No. 86 dated June 1, 1919, with Patterson Concrete Construction Company of Ashland. Time limit December 1, 1919. Started June 15, 1919. William Barnes, inspector. Edward Rose, engineer. Funds all from quarter mill tax fund—state.

(Each of the above units is used as a prefix with the standard feature numbers in the account number book which follows. As the work progresses the above index is added to—that is, the date of completion is recorded. Changes in engineers, inspectors, superintendents, etc., with date of change is recorded, and any other matters having important bearing on the work.)

BRIDGE PREFIX NUMBERS (Sample)

(To be used with feature "Administrative—Bridge Department" Nos. 76 to 110 and "Bridges—Steel, Concrete and Frame, Nos. 806 to 885 only.)

No. 123. Plans and specifications Polk-Marion county bridge on Pacific Highway, over Willamette river, at Salem. Including approaches over one-half mile in length. Estimated cost \$265,000. Concrete piers, steel frame. Started June 1, 1918. Estimated date of completion May 1, 1919. R. E. Mair, engineer in charge. River Bridge Company, contractors. Contract No. 901, dated May 25, 1918.

No. 124. Plans and specifications wooden span, concrete piers, on John Day Highway in Grant county, over North Fork John Day river. Work to be done by state force account. Funds all state. Thomas R. Lee, superintendent of construction, in charge.

No. 125. Plans and specifications for 175 foot trestle, reinforced concrete, over Mosier creek on Columbia River Highway in Wasco county, near The Dalles—south. Robert Johnson, contractor. Estimated cost \$12,000. Contract 807, dated May 1, 1918. James Simpson, engineer in charge.

(Above prefixes used with Administrative numbers 76 to 110 would denote office work, making plans, etc., while when used with Construction numbers 806 to 885 denote straight construction and charges for field work.

CULVERT PREFIX NUMBERS (Sample)

(Following prefixes to be used only with Feature "Culvert and Drains," Nos. 711 to 765, or "Special Numbers for Construction of Reinforced Concrete Box Culverts," Nos. 766 to 805.)

51. Box culvert 3 foot by 6 foot—72 foot long, across Columbia Highway in Columbia county—three miles south of Rainier. Cost \$896.00.

52. Ingot iron culvert, three feet diameter, on Columbia River Highway, one mile north of Rainier. Cost \$296.00. Length 48 feet.

53. 24-inch vitrified pipe culvert on Pacific Highway south of Ashland. Cost \$485.00. Length 32 feet.

(Note.—Even the index numbers of culvert and bridges may be the same, there can be no confusion, as the prefixes are used on different features. There is also explained under features "Culverts and Drains" a different method of arranging prefix from the method outlined above. Either of them are practicable.)

ACCOUNT NUMBER BOOK

ITS GENERAL USE

Instructions As to Its Use

Of the 885 numbers which make up the account number book following only a few are used by any one engineer and timekeeper at one time. As work is assigned to an engineer or superintendent, only those features and numbers which he will have use for on his work should be handed him. To give him the entire book would usually mean confusion and the charging of items to improper numbers. There follows herewith a sample of letter to an engineer who is being sent out to take charge of a project:

Salem, June 10, 1919.

Mr. Edward Rose, Engineer,
Glendale, Ore.

Dear Sir:

Herewith set of Standard Feature Numbers covering work assigned you by State Highway Engineer, under date of June 9, 1919. Only Features "General Field" 151 to 195; "Camp Construction" 196 to 225; "Messhouse Construction and Operation" 226 to 245; "Construction and Operation Corrals" 246 to 265; "Construction and Operation of Blacksmith Shop" 266 to 285; "Hard Surfacing (Concrete)" 561 to 615; "Construction of Sub-Grade and Spreading and Rolling Crushed Rock and Gravel" 381 to 450 are required on this work and you will only make charges to such features.

Prefix to Be Used

1. Numerous blank spaces are left in the feature to be filled in from time to time as the work progresses. Your work being in Douglas county, kindly use the root prefix "10" to cover work which is chargeable to the county operations as a whole—such as the cost of meals for a visiting inspection party which is covering all the projects in the county, as well as yours and for the use of your car by such officials who may be covering county work. For the charges against the project assigned to you, kindly use the prefix "10 e." This prefix should be used on all direct charges against this work for both materials and labor, with the proper item as listed under features.

Use Prefixes on Invoices and Timebook

2. For labor charges you will note the prefix 10 e on the cover of your timebook and use feature numbers contained herein. On invoices for materials and supplies, kindly use the rubber stamp which has been mailed under separate cover, "10 e" and insert number or numbers to which materials and supplies should be charged. For instance if you receive one dozen bolts for repairs to plow, the invoice should bear your "O. K." and the notation 10 e—402. (Repairs to equipment.) If these bolts were to repair road grader then they would be charged to 10 e—408. After goods have been received and found in good order, return invoice promptly for payment to general office.

Importance of Care and Accuracy

3. The value of costs gathered through this system depends largely on the carefulness of time-

keepers and engineers in making charges against the proper numbers. There should never be great doubt as to the proper number to use. If there does arise some question, especially with new employes, kindly take up with the auditor for definite decision.

No Changes to Be Made in Field

4. No changes, additions or erasures should be made in this account number book without authority in writing from the auditor. When it is considered advisable to add numbers for special work, kindly address the general office, and if there is no objection to the changes being made, a circular letter will be issued and sent to each employe affected by this change.

Carefully Study Items of Features

5. Before using any of the numbers on new work, employes should carefully go over each item in the features, and if there is apparent conflict in items as applied to your special work, decide definitely on the one to be used. Do not charge work of the same nature to one number one day and the next day the same work to another number. For instance: You have an item, "labor repairs to equipment" and "labor carpenter." The carpenter may occasionally be called on to repair equipment and while on such work should be carried under that number, but if there is doubt as to whether his services should be charged to repairs to equipment or carpenter work, a definite decision should be made and all like work charged to one or the other. Decide as each question comes up how you will charge certain work, then stick steadfastly by

it. There are not likely to be many of these questionable charges, but a few will materialize.

Charges Based on Work Performed

6. It should be distinctly remembered that the number to be used in all cases depends on the kind of work done rather than an employe's title. For instance, an engineering party is engaged in doing the actual manual labor of erecting camp. While their titles may be "engineer," "rodman," etc., if the work done is "carpenter work on erection of camp," time of these men should be charged to the same number which would be used had carpenters actually been doing the work, and not to "engineering" on this feature. It is the labor cost desired rather than a segregation of titles.

Account Number for Every Charge

7. Every charge that requires the payment of money or the crediting back of money into a feature, should bear an account number and the proper prefix, and no bill for service, material, supplies or equipment should come to the general office without an account number attached thereto. This applies to such projects on which a regular storehouse is not maintained. When a storehouse is maintained, the storekeeper must produce account numbers monthly for all requisitions filled.

8. When in doubt write the general office.

(Signed) Thomas A. Jackson, Auditor.

(In Charge of Cost Accounting)

P. S. The writer hopes to visit you on the project about the 15th and will then take up any matters regarding the use of the features numbers, which have troubled you.

T. A. J.

ACCOUNT NUMBER BOOK

FEATURES AND ITEMS

Explanatory Notes—Administrative Features, 1 to 135

Administrative—Expense of State Highway Commission, Nos. 1 to 20.

Administrative—General, Nos. 21 to 75.

Administrative—Bridges, Nos. 76 to 110.

Administrative—Auditing, Nos. 111 to 135.

These four features comprise the administrative “overhead” cost and all the expense of the commission, general office and other administrative charges, including office rental, salaries of office force and all like expenses of a general nature which cannot be fairly and definitely charged to a smaller unit of the work.

These are chargeable to the entire work and to secure reliable cost data such charges must be prorated in some equitable manner to the sections and features of the projects of which they are a part. In most cases a percentage basis of apportioning these charges seems to be the most satisfactory method of securing a fair distribution. An appropriate number in the “General—Field” feature (No. 194 “Administrative charges prorated”) will be found for this purpose. This item, then, with other charges in the feature “General—Field” is prorated to each unit of the project. When costs are finally determined, they include every item for which money has been paid, and

administrative expense—which is just as much a part of the unit cost of every yard of earth moved as the salary of the man at the end of a No. 2 shovel—is not overlooked. The situation of a contractor apparently making money on every yard of earth he moves, and after a few months discovering that the returns from the job are not sufficient to enable him to continue the work, will hardly be possible. Few men on construction work but have witnessed a condition of this kind—usually resulting because administrative expense, and, through a loose system, probably numerous others which are considered “small” and unimportant, having been overlooked. At the same time, by keeping the administrative expense in features as outlined herewith, it is possible to watch it closely and if it gets beyond the amount justified by the magnitude of the job, proper treatment may be immediately given.

ADMINISTRATIVE—Expense of State Highway Commission, 1 to 20

In view of the fact that the commissioners are appointed from the congressional districts, the numbers will hold good continuously, regardless of the changes made in the personel of the commission—except that a record should be made at the time of changing commissioners and the month in which final expense statement is rendered, as to how much of the charge is against the old and how much against the new commissioner.

1. Special engineering.
2. Expense accounts and salaries, employees on special work for commission.
3. Expense account and salary commissioner from first district.

4. Mileage account commissioner from first district.
5. Expense account and salary commissioner from second district.
6. Mileage account commissioner from second district.
7. Expense account and salary commissioner from third district.
8. Mileage account commissioner from third district.
9. Salary secretary to commission.
10. Expense account secretary to commission.
11. Mileage account secretary to commission.
12. Premium on bonds issued by commission.
13. Labor, materials and supplies, maps and blue printing.
14. Labor, materials and supplies, photography.
15. Labor, materials and supplies, clerical.
16. Telephone and telegraph charges.
17. Freight and express charges.
18. Seal of commission, electrotypes, etc.
- 19.
20. Depreciation on equipment.

ADMINISTRATIVE—General, 21 to 75

21. Salaries—State Engineer.
22. Salaries—Chief Deputy State Engineer.
23. Salaries—expert engineering.
24. Salaries—other engineering.
25. Salaries—drafting.
26. Salaries—clerical.
27. Salaries—stenographic.
28. Salaries—leave of absence with pay.
29. Salaries—other than above.
30. Printing bonds and interest on them.
31. Travel and livery expense—State Engineer.
32. Travel and livery expense—Chief Deputy State Engineer.
44. Travel and livery expense—expert engineering.
34. Travel and livery expense—clerical and stenographic.
35. Travel and livery expense—miscellaneous.
36. Travel and livery expense—other engineering.
37. Labor, materials and supplies—blue printing.
38. Labor, materials and supplies—printing and advertising.
39. Labor, materials and supplies—engineering manual.
40. Labor, materials and supplies—accounting manual.
41. Labor, materials and supplies—rental motor vehicles.
42. Labor, materials and supplies—printing, binding and cuts (annual report).
43. Labor, materials and supplies—annual report (other than above).
44. Labor, materials and supplies—reports (other than annual).

45. Labor, materials and supplies—general road map of State.
46. Labor, materials and supplies—road laws.
47. Labor, materials and supplies—cameragraph.
48. Labor, materials and supplies—dictaphone.
49. Labor, materials and supplies—repairs to equipment.
50. Labor, materials and supplies—legal matters.
51. Labor, materials and supplies—photography.
52. Labor, materials and supplies—exhibits.
53. Labor, materials and supplies—general information for future work.
54. Labor, materials and supplies—light, fuel, ice and water.
55. Labor, materials and supplies—testing materials.
56. Labor, materials and supplies—mimeograph.
57. Labor, materials and supplies—standard specification.
58. Labor, materials and supplies—notary public commission.
59. Material and supplies—engineering and construction (field).
60. Material and supplies—engineering and construction (office).
61. Material and supplies—accounting and timekeeping (field).
62. Material and supplies—accounting and timekeeping (office).
63. Material and supplies—stock (requisition from field to be filled from this “stock” and account number credited).
64. Material and supplies—
65. Material and supplies—
66. Material and supplies—
67. Blue prints purchased (outside).
68. Postage.
69. Telephone and telegraph.
70. Freight and express.
71. Rental of equipment.
72. Purchase of equipment.
73. Books and publications.
74. Workmen’s Compensation Act.
75. Depreciation on equipment.

ADMINISTRATIVE—Bridge Department, 76 to 110

76. Salaries—engineering.
77. Salaries—drafting.
78. Salaries—blue printing.
79. Salaries—stenographic and clerical.
80. Salaries—leave of absence with pay.
81. Salaries—inspection of bridges.

82. Salaries—miscellaneous.
83. Salaries—
84. Labor, materials and supplies—cameragraph.
85. Labor, materials and supplies—repairs to equipment.
86. Labor, materials and supplies—printing and advertising.
87. Labor, materials and supplies—photography.
88. Labor, materials and supplies—exhibits.
89. Labor, materials and supplies—light, fuel, ice and water.
90. Labor, materials and supplies—mimeographing.
91. Material and supplies—blue printing.
92. Material and supplies—office use.
93. Material and supplies—field use.
94. Material and supplies—books and publications.
95. Material—
96. Material—
97. Travel and livery.
98. Rental of equipment.
99. Telegraph and telephone.
100. Freight and express.
101. Postage.
102. Purchase of equipment and cabinets.
103. Workmen's Compensation Act.
104. Labor, material and supplies—bridge manual.
105. Labor, material and supplies—bridge standards.
106. Labor, material and supplies—bridge tests.
- 107.
- 108.
- 109.
110. Depreciation on equipment.

ADMINISTRATIVE—Auditing Department, 111 to 135

111. Salaries—accountants and stenographers.
112. Salaries—miscellaneous.
113. Salaries—leave of absence with pay.
114. Labor, materials and supplies—printed forms.
115. Labor, materials and supplies—binders.
116. Labor, materials and supplies—repairs to equipment.
117. Labor, materials and supplies—printing and advertising.
118. Labor, materials and supplies—exhibits.
- 119.—Labor, materials and supplies—bulletins, books and publications.
120. Labor, materials and supplies—
121. Labor, materials and supplies—
122. Labor, materials and supplies—
123. Material and supplies—office.
124. Material and supplies—miscellaneous.
125. Material and supplies—

- 126. Travel and livery.
- 127. Rental of equipment.
- 128. Purchase of equipment.
- 129. Telephone and telegraph.
- 130. Freight and express.
- 131. Workmen's Compensation Act.
- 132. Labor (miscellaenous).
- 133. Surety bonds.
- 134.
- 135. Depreciation on equipment.

AUTOMOBILES AND TRUCKS

As motor vehicles are purchased, they are listed consecutively beginning with No. 1, in the "Motor Vehicle Register." A full description is contained in this register, which is kept open and added to continuously as changes develop. A record of costs covering the operation of each car is kept separately. A report of mileage (reading of the speedometer monthly) and the amount of gasoline in the tank on the last day of each month is reported to the general office. This record is checked from time to time by field inspectors or others charged with that duty. By this method careless drivers are detected and may be educated or disciplined as the case seems to merit. The total cost of operation of cars, together with depreciation costs are charged in a lump sum monthly to the features benefitting. Following will be found four examples of records from the "Motor Vehicle Register." The number given the motor vehicle is used as a prefix with the numbers in the following feature, Nos. 136 to 150.

1. New Jeffery Roadster, Model 671. No. 90,249. 1919 license No. 45464. Purchased January 1, 1919, from Portland Motor Car Company for the use of the State Highway Engineer. Price \$1568.00. No extra rims or parts. September 1, 1919, transferred to Bridge Engineer. Should be charged to Bridge Department operation from September 1, 1919.

2. New Reo Touring car model No. 5. Factory and motor No. R 10,587. 27.2 h. p. Purchased from Northwest Auto Company, September 10, 1916. \$1275.00. Used by John H. Robbins, division engineer, Multnomah county line, on Columbia River Highway to Astoria. All charges should be against this division. License No. 1496.

3. New Chevrolet Baby Grand Touring Car. Engine No. 3183. Body No. B-2041. Factory No. 1-1449. Price \$1265.00 F. O. B. Pendleton, Oregon. Purchased July 1, 1919, from C. & F. Motor Company. For use of Division Engineer Pendleton Division. License No. 189675.

4. New Packard Five Ton Truck No. 124234 purchased from Portland Motor Truck Company August 10, 1917 \$5400.00. License No. 439756. Shipped to Siskiyou Division September 1, 1917. All charges should be against Siskiyou grade. July 1, 1918, transferred to Central Oregon Division. All charges should be against this division from above date until further notice.

Feature Numbers, 136 to 150

The index numbers given motor trucks in the motor vehicle register are used as prefixes with the following feature numbers. The motor vehicle prefix numbers will only be used with the motor vehicle feature numbers 136 to 150 so that there can be no confusion even though the same numbers may be designated as prefix numbers elsewhere. Cars should always be known and referred to by index and license numbers.

- 136. Extra parts, rims, repair parts, etc.
- 137. Tires, patches, shoes, linings, tire repair kits, etc.
- 138. Gasoline.
- 139. Lubricants, oils, polish, etc.
- 140. Rental of garage space.
- 141. Labor, repairs, cleaning and general overhauling.
- 142. License.
- 143. Labor—miscellaneous.
- 144. Materials and supplies—miscellaneous.
- 145. Insurance.
- 146. Freight and express.
- 147. Chauffeur salary and expense.
- 148.
- 149.
- 150. Depreciation charges.

An example as to the use of the prefix and number follows: If gasoline is purchased for the use of the "New Chevrolet Baby Grand Touring Car" the charge on the invoice is simply marked

"3—138." If a general overhauling is given the New Reo Touring car, it is noted on the invoice thus, "2—141," or if rental of garage space is paid (and this covers nightly rental when on a continuous trip as well as monthly rental if car is kept in one place) it is noted on invoice thus "2—140."

The monthly report from one in charge of the machine should contain the reading of the speedometer on the last day of the month, the amount of gasoline in tank and if the speedometer has been out of order any portion of the month, an estimate of the mileage not registered should be made. Also the quantity of gasoline used, if in districts where the price varies and this information cannot be arrived at by the price paid.

The costs usually are kept in three parts. Cost of gasoline and quantity used, to determine the miles per gallon of gas. General operation cost, excluding gasoline, which includes depreciation, and in fact all the items contained in feature numbers except 136, 138, 146 and 147. Then we have left the charges for new parts and if a chauffeur is employed, his salary and expense should be kept separated from the others, as it is the true running cost of the machine which is desired. All the above expenses may be added together, without the chauffeur's salary and expense item and the operating expense per mile is available. If it appears out of proportion with others operated under what is considered as on a similar basis, then an analysis is made, comparing each of the segregations to determine which one is the faulty one. When that is determined, then the invoices may be investigated and proper and

intelligent action based on determined facts, may be taken. We frequently know when looking at a situation as a whole that "something" is wrong. Correction of a fault, however, requires that it first be definitely located.

General—Field, 151 to 195

This feature has the relation to features of one section of the work that administrative features have to all the projects. To this feature all field overhead charges which can not be properly entered against each definite unit of the work in the section should be made. For instance, the one in charge of the section, which may comprise a considerable territory and numerous features, may decide to open an office for the handling of this work at one of the centrally located camps or at a town conveniently situated. His time and that of several assistants is so divided among the various units of the work that it would be impracticable to attempt a segregation of charges on a basis of actual time devoted to each feature. The time of such employes is therefore all carried in this "General—Field" feature; also personal expense accounts and cost of maintaining the office is charged here and prorated quarterly on a percentage basis to each unit of the section. If it so happens that a section has only one active feature, as "Construction Sub-Grade," for example, and all work in the section is confined to one job, there is no use for the feature "General—Field," all charges being made direct to items provided in the feature "Construction Sub-Grade." It will be noted that each of the permanent construction features following has an item "general charges

prorated" for the receiving of their share of the prorated cost of the section "Administrative Expense."

151. Salaries—field engineering.
152. Salaries—office engineering.
153. Salaries—accounting and timekeeping.
154. Salaries—stenographic.
155. Salaries—janitor service (or bull cook).
156. Salaries—leave of absence with pay.
157. Salaries—
158. Material and supplies—stationery (engineering and construction).
159. Material and supplies—stationery (accounting and timekeeping).
160. Material and supplies—engineering and construction.
161. Material and supplies—accounting and timekeeping.
162. Material and supplies—
163. Labor, materials and supplies—light, fuel, ice and water.
164. Labor, materials and supplies—reports.
165. Labor, materials and supplies—printed forms.
166. Labor, materials and supplies—exhibits.
167. Labor, materials and supplies—testing materials.
168. Labor, materials and supplies.
169. Labor, materials and supplies—specifications and plans.
170. Labor, materials and supplies—photography, enlargements, etc.
171. Labor, materials and supplies—electrotypes and cuts.
172. Labor, materials and supplies—storing equipment.
173. Labor, materials and supplies—storing equipment.
173. Labor, materials and supplies and rental motor vehicles.
174. Labor, materials and supplies—commissary.
175. Labor, materials and supplies—advertising.
176. Labor, materials and supplies—legal.
177. Labor, materials and supplies—repairs to equipment (engineering and construction).
178. Labor, materials and supplies—repairs to equipment (accounting and timekeeping).
179. Labor, materials and supplies—
180. Labor, materials and supplies—
181. Labor, materials and supplies—
182. Postage.
183. Travel and livery.
184. Rental of quarters.
185. Rental of equipment.
186. Purchase of equipment.
187. Moving quarters.

188. Telephone and telegraph.
189. Freight, express and parcels post.
190. Rooms and board (not classified as travel expense).
191. Workmen's Compensation Act.
192. Books and publications.
- 193.
194. Administrative charges prorated.
195. Depreciation on equipment.

Camp Construction, 196 to 225

This feature includes all charges for construction of men's quarters, office and outbuildings required in the average camp, except the mess-house, root and meat houses, blacksmith shop and corral, which are covered separately in the features following. One item is intended to cover all maintenance charges. If more segregation of this item is desired, a separate feature can be made for "Camp Maintenance." The tearing down of structures, as well as constructing them and the clearing up of site when work has been completed is included under this feature. Total charges to this feature should be prorated quarterly to features benefited. An item to cover this charge will be found in each of the permanent construction features following.

(Includes office, bunkhouses, outhouses, etc., only.)

196. Salaries—engineering.
197. Salaries—draftsman.
198. Salaries—accounting and timekeeping.
199. Salaries—miscellaneous.
200. Salaries—
201. Labor—superintendence.
202. Labor—carpenters and helpers.
203. Labor—clearing and preparing site.
204. Labor—taking down camp and cleaning up site.
205. Labor—sewer and water systems.
206. Labor—fencing.
207. Labor.
208. Materials and supplies—lumber.
209. Materials and supplies—tents.

- 210. Materials and supplies—hardware.
- 211. Materials and supplies—fencing.
- 212. Materials and supplies—sewer and water systems.
- 213. Materials and supplies—miscellaneous.
- 214. Materials and supplies—roofing.
- 215. Labor, materials and supplies—moving.
- 216. Labor, materials and supplies—maintenance of camp.
- 217. Labor, materials and supplies—
- 218. Rental of grounds.
- 219. Freight and express.
- 220. Purchase of equipment.
- 221. Rental of equipment.
- 222. Workmen's Compensation Act.
- 223.
- 224.
- 225. Depreciation on equipment.

Messhouse Construction and Operation, 226 to 245

This feature usually is considered a commercial enterprise, therefore charges and credits should be kept entirely separated from other features. Frequently supplies purchased for mess consumption are sold to employes whose families are on or near the work. For such credits No. 237 is intended. This is for projects on which a regular mercantile store is not operated. If the mess is not operated as a commercial feature, then the profit or loss, as the case may be, should be credited or charged quarterly to the permanent construction features.

- 226. Labor—cooks and helpers.
- 227. Subsistence.
- 228. Supplies.
- 229. Fuel, light, water and ice.
- 230. Rental of quarters.
- 231. Rental of equipment.
- 232. Purchase of equipment.
- 233. Repairs and renewals.
- 234. Freight and express.
- 235. Labor, materials and supplies—construction of mess-house and dining-room.
- 236. Labor, materials and supplies—construction of root and meat houses.
- 237. Credit for meals and sales from messhouse stock.

- 238. Workmen's Compensation Act.
- 239. Moving outfit.
- 240.
- 241.
- 242.
- 243.
- 244.
- 245. Depreciation on equipment.

Construction and Operation Corrals, 246 to 265

This feature, as with mess operation, is frequently a commercial enterprise, and construction, operation and other expenses connected therewith should be kept entirely separated from other features. When not operated as a commercial feature, the profit or loss should be credited or charged, as the case may be, to the permanent construction features. This distribution of profit or loss should be on a percentage basis.

- 246. Labor—corral man.
- 247. Labor—freighting and handling.
- 248. Labor—shoeing.
- 249. Labor—repairs to harness.
- 250. Labor—repairs to wagons, etc.
- 251. Labor—repairs to building, fences, etc.
- 252. Labor—veterinary.
- 253. Materials and supplies—hay, grain, etc.
- 254. Materials and supplies—drugs, etc.
- 255. Materials and supplies—
- 256. Rental of shelter, pasture, etc.
- 257. Rental of stock.
- 258. Rental of equipment.
- 259. Purchase of equipment.
- 260. Purchase of stock.
- 261. Taxes.
- 262. Labor, materials and supplies—construction of corral.
- 263. Workmen's Compensation Act.
- 264.
- 265. Depreciation on equipment.

Construction and Operation Blacksmith Shop, 266 to 285

Two plans of operation for the blacksmith shop are recommended:

1. On a commercial basis, by which a certain

set price schedule is made and all work handled by the blacksmith shop charged according to definite rates, these rates to be made sufficiently high to cover all overhead, materials, supplies, equipment and loss of time between jobs for which payment must be made.

2. The actual costs of labor, material, supplies and equipment necessary for the operation of shop prorated to the various permanent projects.

Ordinarily the first method is preferable, and, when a carefully planned schedule of prices is made up, results in very accurate cost data. The profit or loss under this method of operation should be prorated to the permanent construction features as a charge or credit, as the case may warrant.

On the smaller jobs, where the blacksmith work is of small volume and there is little or no large machinery on the project, the second method is used with considerable satisfaction.

- 266. Labor—blacksmith.
- 267. Labor—blacksmith helpers.
- 268. Labor—carpenters and helpers.
- 269. Labor—miscellaneous.
- 270. Labor.
- 271. Labor, materials and supplies—construction of building and setting up equipment.
- 272. Labor, materials and supplies—moving quarters.
- 273. Steel.
- 274. Materials.
- 275. Supplies.
- 276. Fuel, light and water.
- 277. Freight and express.
- 278. Rental of equipment.
- 279. Purchase of equipment.
- 280. Rental of grounds.
- 281. Workmen's Compensation Act.
- 282.
- 283.
- 284.
- 285. Depreciation on equipment.

Storehouse Charges, 286 to 305

When a project is of sufficient size to warrant the services of a regular storekeeper and property man, a storehouse for the storage of material, supplies and equipment is usually maintained. All goods for the project are received by the storekeeper and issued to the work on requisitions signed by the representative of the one authorized to receive goods and on which has been placed the account numbers to which the charges should be made. At the close of the month, when the storehouse stock is inventoried, the storekeeper must account for the goods on hand at the beginning of the month and those received during the month. The inventory of the close of the month, plus summary of charges by account numbers of goods issued during the month (which record is verified by requisitions properly signed by men on the work authorized to receive goods), should make this balance.

Two methods of handling storehouse charges are recommended:

1. Storehouse administrative expense includes salary of storekeeper and other storehouse employes, rental or cost of building, freight on material, supplies and equipment to storehouse, and the freighting from storehouse to the work. A certain estimated charge is also made to cover shrinkage, leakage, breakage, etc. A price list of the goods handled is made up and the cost increased sufficiently to include this and all the above administrative charges. Charges to the work for supplies furnished from the storehouse are made on this basis. This arrangement should

result in a small profit for the storehouse. If it does, this profit can be prorated quarterly on a percentage basis as a credit to the "Permanent Construction" features. If the result is a loss, it should be charged in the same manner.

2. By this method supplies, materials and equipment will be charged out to the work at their actual cost, plus freight. The expense of operating storehouse, including all the items in the first method above mentioned, is prorated on a percentage basis to the "Permanent Construction" features.

- 286. Salaries.
- 287. Labor—freighting.
- 288. Goods spoiled, broken or leaked.
- 289. Labor—repairs to building.
- 290. Labor—erection of building.
- 291. Labor—miscellaneous.
- 292. Materials and supplies—repairs to building.
- 293. Materials and supplies—erection of building.
- 294. Rental of quarters.
- 295. Rental of equipment.
- 296. Purchase of equipment.
- 297. Repairs to equipment.
- 298. Telephone and telegraph charges.
- 299. Freight and express charges.
- 300. Light, fuel and water.
- 301. Materials and supplies—miscellaneous.
- 302.
- 303.
- 304.
- 305. Depreciation on equipment.

Surveys (Preliminary, Location and Land Ties), 306 to 340

This feature is self-explanatory and all charges incident to surveys on location, up to the time that actual work has begun on the next feature, "Right of Way" should be charged to it.

- 306. Salaries—preliminary transit line.
- 307. Salaries—preliminary level line.
- 308. Salaries—preliminary topography.

- 309. Salaries—preliminary drafting.
- 310. Labor, materials and supplies—livery and travel.
- 311. Materials and supplies—
- 312. General reconnaissance.
- 313. Salaries—location (transit party).
- 314. Salaries—location (level party).
- 315. Salaries—location (topography party).
- 316. Salaries—location (drafting).
- 317. Salaries—location (digging test pits).
- 318. Salaries—location (bridges and culverts).
- 319. Salaries—location (sounding for grade).
- 320. Salaries—location (estimates).
- 321. Labor, materials and supplies—livery and travel.
- 322. Materials and supplies—
- 323. Room and board.
- 324. Salaries—land ties (office labor).
- 325. Salaries—land ties (field labor).
- 326. Salaries—land ties (drafting).
- 327. Labor, materials and supplies—livery and travel.
- 328. Materials and supplies—land ties.
- 329. Labor, materials and supplies—mapping old roads.
- 330.
- 331. Rental of quarters.
- 332. Rental of equipment.
- 333. Purchase of equipment.
- 334. Telephone and telegraph.
- 335. Leave of absence with pay.
- 336. Workmen's Compensation Act.
- 337.
- 338.
- 339.
- 340. Depreciation on equipment.

Right of Way, 341 to 380

Against this feature should be charged all expense of securing right of way, grubbing, clearing, burning brush and fencing, and other expenses up to the point of "Construction of Sub-Grade." It is frequently the case that portions of work chargeable to this feature are left until the construction on sub-grade is started or perhaps completed. Such items as burning brush and logs and building fence are in this class. The charges, regardless of when the work may be done, should be to the "Right of Way" feature. This is consid-

ered one of the "Permanent Construction" features to which administrative charges are prorated.

341. Salaries—engineering.
342. Salaries—drafting.
343. Salaries—accounting and timekeeping.
344. Labor—superintendence.
345. Labor—clearing (by hand).
346. Labor—grubbing.
347. Labor—clearing and grubbing (donkey engine).
348. Labor—repairs to equipment.
349. Labor—fencing.
350. Labor—piling and burning brush and logs.
351. Labor—fighting fire.
352. Labor—
353. Materials and supplies—explosives.
354. Materials and supplies—repairs to equipment.
355. Materials and supplies—clearing and grubbing (hand).
356. Materials and supplies—clearing and grubbing (donkey engine).
357. Materials and supplies—office (engineering and construction).
358. Materials and supplies—office (accounting and timekeeping).
359. Materials and supplies—fencing.
360. Materials and supplies—burning and piling brush.
361. Materials and supplies—fighting fire.
- 362.
363. Purchase of land.
364. Payment of damages.
365. Rental and lease of land.
366. Travel and livery.
367. Legal expense.
368. Rental of equipment.
369. Telephone and telegraph charges.
370. Freight and express.
371. Advertising.
372. Purchase of equipment.
- 373.
374. Workmen's Compensation Act.
375. Contractor's earnings.
376. Prorated charges—construction and maintenance (camp).
377. Prorated charges—construction and maintenance (corral).
378. Prorated charges—construction and maintenance (mess).

- 379. Prorated charges—general.
- 380. Depreciation on equipment.

**Construction of Sub-Grade, and Spreading
and Rolling Crushed Rock and Gravel, 381 to 450**

This feature should include all charges for the grading of the road, as provided for in previous features, after right of way has been cleared and grubbed. The cost of surfacing with crushed rock or gravel to the point when a permanent hard surface is laid should also be charged against this feature. When an interval elapses between the time of making grade and applying of hard surfacing material, which is usually the case, all charges for resurfacing and putting grade in condition for the receiving of the hard surface, including additional rock, sand and gravel for this purpose, should be included in the above feature. This is considered one of the "Permanent Construction" features to which administrative charges are prorated.

- 381. Salaries—engineering.
- 382. Salaries—drafting.
- 383. Salaries—accounting and timekeeping.
- 384. Salaries—
- 385. Salaries—
- 386. Labor—superintendence.
- 387. Labor—plowing.
- 388. Labor—excavation (hand).
- 389. Labor—excavation (other than by hand).
- 390. Labor—repairs to equipment.
- 391. Labor—tool sharpener.
- 392. Labor—ditching and draining.
- 393. Labor—soaking.
- 394. Labor—rolling.
- 395. Labor—disposing of slides.
- 396. Labor—tractors.
- 397. Labor—freighting materials and handling.
- 398. Labor—carpenter work.
- 399. Labor—cribbing.
- 400. Labor—falsework.
- 401. Labor—finishing.

- 402. Labor—drilling and powder man.
- 403. Labor—guard rails.
- 404. Labor—hauling gravel and crushed stone.
- 405. Labor—spreading gravel and crushed stone.
- 406. Labor—helper team (hauling autos over new construction).
- 407. Labor—
- 408. Labor, materials and supplies—road grader work.
- 409. Labor, materials and supplies—grade crossings.
- 410. Labor, materials and supplies—maintenance.
- 411. Labor, materials and supplies—
- 412.
- 413. Materials and supplies—explosives.
- 414. Materials and supplies—ditching and draining.
- 415. Materials and supplies—soaking.
- 416. Materials and supplies—rolling.
- 417. Materials and supplies—disposing of slides.
- 418. Materials and supplies—lumber.
- 419. Materials and supplies—cement.
- 420. Materials and supplies—repairs to equipment.
- 421. Materials and supplies—tool sharpener.
- 422. Materials and supplies—fuel, light and water.
- 423. Materials and supplies—falsework.
- 424. Materials and supplies—finishing.
- 425. Materials and supplies—crushed rock and gravel.
- 426. Materials and supplies—spreading crushed rock and gravel.
- 427. Materials and supplies—guard rails.
- 428. Materials and supplies—miscellaneous.
- 429. Materials and supplies—survey stakes.
- 430. Materials and supplies—
- 431. Purchase of equipment.
- 432. Rental of equipment.
- 433. Travel and livery.
- 434. Legal expense.
- 435. Telephone and telegraph.
- 436. Freight and express.
- 437. Advertising.
- 438. Freight on equipment.
- 439. Moving and storing equipment.
- 440.
- 441.
- 442.
- 443. Workmen's Compensation Act.
- 444. Contractor's earnings.
- 445. Prorated charges—construction and maintenance (camp).
- 446. Prorated charges—construction and maintenance (corral).

- 447. Prorated charges—construction and maintenance (mess).
- 448. Prorated charges—industrial railway operation.
- 449. Prorated charges—general.
- 450. Depreciation on equipment.

Riprapping, 451 to 490

This feature includes all charges for riprapping of grades and other places along the highway, except those directly connected with and a part of the bridge and culvert work. This feature is intended to include the entire operation of riprapping, getting out rock, hauling and other preliminary work necessary to make a finished job. This is considered one of the "Permanent Construction" features to which administrative charges are prorated.

- 451. Salaries—engineering.
- 452. Salaries—drafting.
- 453.—Salaries—accounting and timekeeping.
- 454. Salaries—
- 455. Labor—superintendence.
- 456. Labor—preliminary and drainage.
- 457. Labor—excavation (hand).
- 458. Labor—excavation (other than by hand).
- 459. Labor—getting out rock.
- 460. Labor—freighting and placing rock.
- 461. Labor—backfill.
- 462. Labor—repairs to equipment.
- 463. Labor—
- 464. Materials and supplies—lumber.
- 465. Materials and supplies—stone and gravel.
- 466. Materials and supplies—cement and lime.
- 467. Materials and supplies—explosives.
- 468. Materials and supplies—pipe and tile.
- 469. Materials and supplies—hardware.
- 470. Materials and supplies—repairs to equipment.
- 471. Materials and supplies—
- 472. Rental of equipment.
- 473. Purchase of equipment.
- 474. Freight and express.
- 475. Travel and livery.
- 476. Legal expense.
- 477. Telephone and telegraph.
- 478. Advertising.

- 479. Freight on equipment.
- 480. Moving and storing equipment.
- 481. Workmen's Compensation Act.
- 482. Contractor's earnings.
- 483.
- 484.
- 485. Prorated charges—construction and maintenance (camp).
- 486. Prorated charges—construction and maintenance (corral).
- 487. Prorated charges—construction and maintenance (mess).
- 488. Prorated charges—industrial railway operation.
- 489. Prorated charges—general.
- 490. Depreciation on equipment.

Gravel Screening and Rock Crushing Plant, 491 to 535

This feature covers all charges necessary to produce crushed rock and gravel up to the point of delivering the finished product to conveyances at the plant. Items covering the cost of hauling from the crusher and spreading on the grade are contained in "Construction Sub-Grade" feature. This is considered to have such relationship with the "Permanent Construction" features that administrative charges are prorated against it.

- 491. Salaries—engineering.
- 492. Salaries—draftsman.
- 493. Salaries—accounting and timekeeping.
- 494. Salaries—checker and loader at bins.
- 495. Labor—superintendence.
- 496. Labor—erecting plant.
- 497. Labor—drilling and blasting.
- 498. Labor—handling materials.
- 499. Labor—stripping pit.
- 500. Labor—crushing.
- 501. Labor—repairs to equipment.
- 502. Labor—tool sharpener.
- 503. Labor—repairs and work on pit.
- 504. Labor—moving equipment.
- 505. Labor—hauling fuel for crusher.
- 506. Materials and supplies—lumber.
- 507. Materials and supplies—nails, bolts, hardware, etc.
- 508. Materials and supplies—repairs to equipment.
- 509. Materials and supplies—explosives.
- 510. Materials and supplies—tool sharpener.

- 511. Materials and supplies—drill steel.
- 512. Materials and supplies—engine oil, lubricants, etc.
- 513. Materials and supplies—fuel, light and water.
- 514.
- 515
- 516.
- 517. Royalties on crushed rock.
- 518. Rental of equipment.
- 519. Purchase of equipment.
- 520. Freight and express.
- 521. Travel and livery.
- 522. Legal expense.
- 523. Telephone and telegraph.
- 524. Advertising.
- 525. Freight on equipment.
- 526. Moving and storing equipment.
- 527. Workmen's Compensation Act.
- 528. Contractor's earnings.
- 529.
- 530. Prorated charges—construction and maintenance
(camp).
- 531. Prorated charges—construction and maintenance
(corral).
- 532. Prorated charges—construction and maintenance
(mess).
- 533. Prorated charges—industrial railway operation.
- 534. Prorated charges—general.
- 535. Depreciation on equipment.

Operation Industrial Railway, 536 to 560

This feature has a very close relationship and is frequently considered as subsidiary to several other features. There are, however, several reasons for making it a separate unit:

1. It is comprised of considerable costly equipment which is a unit in itself.
2. It is used wholly or in part by several features of the project at short intervals, which necessitates an arbitrary division of costs such as prorating on a percentage or other basis rather than actual.
3. Cost of delivery of materials is a very good segregation for a permanent record.

This feature is intended to include cost of any service for which the plant may be fitted. On the completion of the work charges may still be carried as a separate feature, or they can be prorated on some equitable basis to the features benefiting.

- 536. Salaries—engineering.
- 537. Salaries—draftsman.
- 538. Salaries—accounting and timekeeping.
- 539. Labor—driving engine.
- 540. Labor—brakeman.
- 541. Labor—section man.
- 542. Labor—greasing cars.
- 543. Labor—repairs to equipment.
- 544. Labor—laying and removing track.
- 545. Labor—loading cars.
- 546. Labor—freight and handling equipment.
- 547. Labor—
- 548. Labor, materials and supplies—fuel and oil.
- 549. Materials and supplies—repairs to equipment.
- 550. Materials and supplies—freight and handling.
- 551. Materials and supplies—water and light.
- 552.
- 553.
- 554. Rental of equipment.
- 555. Purchase of equipment.
- 556. Legal expense.
- 557. Storing equipment.
- 558. Contractor's earnings.
- 559. Workmen's Compensation Act.
- 560. Depreciation on equipment.

Hard Surface (Concrete), 561 to 615

This feature covers the assembling, erection and operation of concrete plant and all charges connected with laying of hard surface. Charges incident to preparing sub-grade for hard surfacing should be made against "Construction Sub-Grade." Scarifying old macadam would be such a charge. This is considered a "Permanent Construction" feature, and to it should be prorated its share of administrative charges.

- 561. Salaries—engineering.
- 562. Salaries—draftsman.
- 563. Salaries—accounting and timekeeping.

- 564. Labor—superintendence.
- 565. Labor—making and placing forms.
- 566. Labor—removing forms.
- 567. Labor—mixing and pouring concrete.
- 568. Labor—expansion joints.
- 569. Labor—finishing surface.
- 570. Labor—protecting, covering and sprinkling.
- 571. Labor—watchman.
- 572. Labor—shaking and binding empty sacks.
- 573. Labor—hauling and placing water pipe.
- 574. Labor—removing water pipe.
- 575. Labor—pumping.
- 576. Labor—repairs to equipment.
- 577. Labor—rolling and smoothing sub-grade.
- 578. Labor—unloading, handling and hauling cement.
- 579. Labor—unloading, handling and hauling sand and gravel.
- 580. Labor—shoulders.
- 581. Labor—scarifying old macadam road.
- 582. Labor—spreading sand and gravel.
- 583.
- 584. Materials and supplies—lumber.
- 585. Materials and supplies—cement.
- 586. Materials and supplies—explosives.
- 587. Materials and supplies—sand and gravel (roadway)
- 588. Materials and supplies—sand and gravel (shoulders)
- 589. Materials and supplies—lubricating and fuel oil.
- 590. Materials and supplies—water, fuel and light.
- 591. Materials and supplies—repairs to equipment.
- 592. Materials and supplies—
- 593. Labor, materials and supplies—testing cement and other materials.
- 594.
- 595. Travel and livery.
- 596. Freight and express on sand and rock.
- 597. Freight and express on cement.
- 598. Freight and express on lumber.
- 599. Freight and express on incidentals.
- 600. Advertising.
- 601. Rental of equipment.
- 602. Purchase of equipment.
- 603. Legal expense.
- 604. Telephone and telegraph.
- 605. Freight and express on equipment.
- 606. Moving and storing equipment.
- 607. Workmen's Compensation Act.
- 608. Contractor's earnings.
- 609.
- 610. Prorated charges—construction and maintenance (camp).

- 611. Prorated charges—construction and maintenance (corral).
- 612. Prorated charges—construction and maintenance (mess).
- 613. Prorated charges—industrial railway operation.
- 614. Prorated charges—general.
- 615. Depreciation on equipment.

**Setting Up and Operating Paving Plant
(Asphaltic Surface), 616 to 670**

This feature covers the manufacture of any asphaltic combination, hard surfacing material, such as asphaltic concrete, bitumen, Warrenite, bitulithic, Topeka mix, etc. All charges incident to the manufacture of asphaltic surfacing material, up to the time the finished product is dumped into the conveyances for delivery to the job, should be made against this feature. The hauling charge for the manufactured product from point of delivery is made against the feature following—(Paving—Asphaltic).

This is considered so nearly related to “Permanent Construction” feature that prorated charges for administrative expense are made against it.

- 616. Salaries—engineering.
- 617. Salaries—drafting.
- 618. Salaries—accounting and timekeeping.
- 619. Labor—superintendence.
- 620. Labor—erection and assembling plant and equipment.
- 621. Labor—maintenance and repairs to equipment.
- 622. Labor—steam engineer.
- 623. Labor—asphaltic aggregate and mixture control.
- 624. Labor—watchman.
- 625. Labor—fuel, water and light.
- 626. Labor—unloading and handling sand, crushed rock and gravel.
- 627. Labor—laboratory.
- 628. Labor—dismantling and storing or shipping plant.
- 629. Labor—asphalt.
- 630. Labor—mixing crushed rock, gravel and sand.
- 631. Labor—cement.
- 632.
- 633. Materials and supplies—screenings

- 634. Materials and supplies—sand.
- 635. Materials and supplies—gravel.
- 636. Materials and supplies—erection and assembling
plant and equipment.
- 637. Materials and supplies—maintenance and repairs
to plant and equipment.
- 638. Materials and supplies—fuel, water and light.
- 639. Materials and supplies—lubricants and oil.
- 640. Materials and supplies—laboratory.
- 641. Materials and supplies—asphalt.
- 642. Materials and supplies—crushed rock.
- 643. Materials and supplies—cement.
- 644. Materials and supplies—lumber.
- 645. Materials and supplies—miscellaneous.
- 646. Purchase of equipment (construction and engineer-
ing).
- 647. Purchase of equipment (laboratory).
- 648. Rental of equipment (laboratory).
- 649. Rental of equipment (construction and engineering).
- 650. Rental or purchase of site for plant.
- 651. Freight and express on asphalt.
- 652. Freight and express on sand and gravel.
- 653. Freight and express on plant.
- 654. Freight and express on miscellaneous.
- 655. Advertising.
- 656. Legal expense.
- 657. Telephone and telegraph.
- 658. Workmen's Compensation Act.
- 659. Contractor's earnings.
- 660. Travel and livery.
- 661.
- 662.
- 663.
- 664.
- 665. Prorated charges—construction and maintenance
(camp).
- 666. Prorated charges—construction and maintenance
(corral).
- 667. Prorated charges—construction and maintenance
(mess).
- 668. Prorated charges—industrial railway operation.
- 669. Prorated charges—general.
- 670. Depreciation on equipment.

Paving (Asphaltic), 671 to 710

This feature includes the same asphaltic combinations as mentioned in the one preceding. All charges incident to the laying of surfacing materials, from the time the manufactured product

is dumped into the conveyance at the plant, should be made against this feature. Such charges as the preparation of the grade; of scarifying old macadam, and such expense as to prepare the grade for the receiving of the permanent hard surfacing material, should be made against "Construction Sub-Grade" feature. This is considered a "Permanent Construction" feature and receives its portion of the prorated administrative charges.

- 671. Salaries—engineering.
- 672. Salaries—drafting.
- 673. Salaries—accounting and timekeeping.
- 674. Salaries—inspector.
- 675. Labor—superintendence.
- 676. Labor—scarifying old macadam.
- 677. Labor—grading.
- 678. Labor—coarse base rock unloading, hauling, spreading, etc.
- 679. Labor—rolling base rock.
- 680. Labor—side drainage.
- 681. Labor—setting form boards.
- 682. Labor—hauling and spreading asphaltic concrete.
- 683. Labor—hauling and spreading bitumen.
- 684. Labor—hauling water and sprinkling.
- 685. Labor—rolling binder and top course.
- 686. Laboratory expense.
- 687.
- 688.
- 689. Materials and supplies—fuel and lubricating oils for rollers.
- 690. Materials and supplies—small hardware.
- 691. Materials and supplies—cement.
- 692. Materials and supplies—repairs to equipment.
- 693. Materials and supplies—
- 694. Purchase of equipment.
- 695. Rental of equipment.
- 696. Travel and livery.
- 697. Advertising.
- 698. Legal expense.
- 699. Telephone and telegraph.
- 700. Workmen's Compensation Act.
- 701. Contractor's earnings.
- 702.
- 703.
- 704.
- 705. Prorated charges—construction and maintenance (camp).

- 706. Prorated charges—construction and maintenance (corral).
- 707. Prorated charges—construction and maintenance (mess).
- 708. Prorated charges—industrial railway operation.
- 709. Prorated charges—general.
- 710. Depreciation on equipment.

Culverts and Drains, 711 to 765

To secure intelligent costs on this feature, each drain and culvert should be so designated that its cost can be ascertained separately. The most simple method by which this result can be accomplished is a plain numerical system of numbering.

Starting from the lowest station number, the first culvert on the profile should be given No. 1 and follow in order as they appear on the profile. Should it later occur that some culverts on the profile were not constructed or their location changed, this can be remedied in the final index, which should be a concise description of the culvert, giving station number, size, length and kind of material used, that there may be no doubt as to its identity. Also the date started and finished. This number should follow the prefix symbol, thus: 9a-3 (3 is the culvert number), 16-inch vitrified pipe drain, 32 feet long, Station 23-50. (The symbol 9a locates the culvert as to project.) In making charges against this culvert, if it be on an invoice, the following combination would be used: 9a-3-737 (for material and supplies, 18-inch pipe or tile). The index would state whether pipe or tile, and the kind, so that with this notation the history of the culvert would be complete. If it happened to be a labor charge the 9a prefix would appear on the timebook cover so that the item op-

posite the man's name showing segregation of time would be thus: 3-714 (for labor—superintendence, on culvert No. 3). All charges incident to the construction of culverts and drains should be made against this, which is considered a "Permanent Construction" feature and carries its prorated apportionment of administrative charges.

- 711. Salaries—engineering.
- 712. Salaries—drafting.
- 713. Salaries—accounting and timekeeping.
- 714. Labor—superintendence.
- 715. Labor—concrete forms.
- 716. Labor—hauling and placing reinforcing steel.
- 717. Labor—mixing and placing concrete.
- 718. Labor—excavation.
- 719. Labor—placing concrete pipe and tile.
- 720. Labor—placing metal culvert.
- 721. Labor—finishing.
- 722. Labor—repairs to equipment.
- 723. Labor—freighting and handling materials.
- 724. Labor—backfilling.
- 725.
- 726.
- 727. Labor—
- 728. Labor, materials and supplies—screening gravel.
- 729. Labor, materials and supplies—rock headwalls.
- 730. Labor, materials and supplies—concrete head walls.
- 731. Materials and supplies—lumber.
- 732. Materials and supplies— 4-inch pipe or tile.
- 733. Materials and supplies— 6-inch pipe or tile.
- 734. Materials and supplies— 8-inch pipe or tile.
- 735. Materials and supplies—10-inch pipe or tile.
- 736. Materials and supplies—12-inch pipe or tile.
- 737. Materials and supplies—18-inch pipe or tile.
- 738. Materials and supplies—24-inch pipe or tile.
- 739. Materials and supplies—30-inch pipe or tile.
- 740. Materials and supplies—36-inch pipe or tile.
- 741. Materials and supplies—cement and sacks.
- 742. Materials and supplies—hardware.
- 743. Materials and supplies—hydrated lime.
- 744. Materials and supplies—repairs to equipment.
- 745. Materials and supplies—sand.
- 746. Materials and supplies—gravel.
- 747. Materials and supplies—explosives.
- 748. Materials and supplies—reinforcing steel.
- 749. Materials and supplies—
- 750.

- 751. Freight and express.
- 752. Purchase of equipment.
- 753. Rental of equipment.
- 754. Travel and livery.
- 755. Advertising.
- 756. Legal expense.
- 757. Telephone and telegraph.
- 758. Workmen's Compensation Act.
- 759. Contractor's earnings.
- 760. Prorated charges—construction and maintenance
(camp).
- 761. Prorated charges—construction and maintenance
(corral).
- 762. Prorated charges—construction and maintenance
(mess).
- 763. Prorated charges—industrial railway operation.
- 764. Prorated charges—general.
- 765. Depreciation on equipment.

**Special Numbers for Construction of
Reinforced Concrete Box Culvert, 766 to 805**

The charges for construction of concrete box, or other small culverts and drains would ordinarily be carried under the preceding feature. However the items in this feature have been assembled to cover this special construction and as they are listed in a manner different from the regular culvert and drain feature, are included in the account number book. This is considered a "Permanent Construction" feature and should bear its share of the prorated administrative charges.

By use of a prefix number, this standard feature is used on all work under similar conditions. Each culvert is numbered and indexed, giving location, size, date of commencement of construction, and such additional data necessary to positively and permanently identify it. The number used to index the culvert answers the purpose of a "prefix" number and is used with each item of the feature. To illustrate, thus:

28-775 inserted on an invoice indicates that the charge is for cement and assessed against culvert 28. A summary of charges against 28-775 will indicate at any time the aggregate cost of cement on this project.

If the cost of the cement at the job is desired (which would include hauling and handling charges), add all charges against numbers 28-775 and 28-776. This process may be followed to secure any combination of costs desired so that data may be given in detail or in aggregate according to the desires of the administrative and operation officials.

The segregation of the timebook entries designate labor charges and all labor and service charges should pass through the timebook. The total of invoice and other charges indicate material cost and miscellaneous expense against the project, by items as listed in feature numbers.

- 766. Engineering.
- 767. Superintendence.
- 768. Excavation.
- 769. Sand and gravel.
- 770. Screening sand and gravel.
- 771. Sacking sand and gravel (including sacks).
- 772. Hauling sand and gravel.
- 773. Water.
- 774. Hauling water.
- 775. Cement.
- 776. Hauling cement.
- 777. Reinforcing steel.
- 778. Hauling reinforcing steel.
- 779. Placing reinforcing steel.
- 780. Form material.
- 781. Hauling form material.
- 782. Constructing forms.
- 783. Stripping forms.
- 784. Mixing and placing concrete.
- 785. Explosives.
- 786. Repairs to equipment.
- 787. Purchase of equipment.

- 788. Travel and livery.
- 789. Advertising.
- 790. Legal expense.
- 791. Telephone and telegraph.
- 792. Workmen's Compensation Act.
- 793. Contractor's earnings.
- 794. Freight and express.
- 795.
- 796.
- 797.
- 798.
- 799.
- 800. Prorated charges—construction and maintenance (camp).
- 801. Prorated charges—construction and maintenance (corral).
- 802. Prorated charges—construction and maintenance (mess).
- 803. Prorated charges—industrial railway operation.
- 804. Prorated charges—general.
- 805. Depreciation on equipment.

(Note.—The item "Hauling" is given special prominence in this feature. The work for which this feature was prepared was in the mountainous districts away from railroad transportation and the hauling was by team from the valley up to a high altitude. One of the heavy expenses and a big factor in costs was that of transportation of materials. Therefore this segregation, as much additional work was contemplated under similar conditions, and a better basis for estimating costs on future work desired).

Bridge-Steel, Concrete or Frame, 806 to 885

Structures for which these feature numbers are used should be numbered in the manner suggested under "Bridge Prefix Numbers" page 35. The items listed under this feature are expected to cover any form or type of bridge construction, large or small. The number used to designate the structure should be carried in an index stating the type of bridge, its location, length, date of contract, date of starting work, date of completion, cost and all other detailed information pertinent to its identity. This is considered a "Permanent Construction" feature

and should receive its share of prorated administrative charges.

- 806. Salaries—engineering.
- 807. Salaries—drafting.
- 808. Salaries—detailing.
- 809. Salaries—inspection.
- 810. Salaries—accounting and timekeeping.
- 811. Salaries—
- 812. Labor—superintendence.
- 813. Labor—temporary building.
- 814. Labor—assembling equipment.
- 815. Labor—erecting plant.
- 816. Labor—test pits, borings, soundings.
- 817. Labor—testing materials.
- 818. Labor—excavation (wet).
- 819. Labor—excavation (dry).
- 820. Labor—erecting falsework.
- 821. Labor—erecting concrete forms.
- 822. Labor—taking down concrete forms.
- 823. Labor—placing reinforcing steel.
- 824. Labor—mixing and pouring concrete.
- 825. Labor—taking down falsework.
- 826. Labor—sheeting.
- 827. Labor—placing concrete pipe or tile.
- 828. Labor—placing metal culvert.
- 829. Labor—rubble masonry and other retaining walls.
- 830. Labor—applying waterproofing.
- 831. Labor—pumping.
- 832. Labor—handling materials and supplies.
- 833. Labor—repairs to equipment.
- 834. Labor—hand rail.
- 835. Labor—carpenter.
- 836. Labor—finishing concrete.
- 837. Labor—erecting steel.
- 838. Labor—riveting steel (field).
- 839. Labor—painting.
- 840. Labor—framing timbers and placing.
- 841. Labor—driving piles.
- 842. Labor, materials and supplies—floor.
- 843. Labor, materials and supplies—taking down old bridge.
- 844. Labor, materials and supplies—moving and storing equipment.
- 845. Backfill to bridges.
- 846.
- 847. Materials and supplies—lumber.
- 848. Materials and supplies—hardware.
- 849. Materials and supplies—repairs to equipment.
- 850. Materials and supplies—testing materials.
- 851. Materials and supplies—cement and sacks.

- 852. Materials and supplies—reinforcing steel.
- 853. Materials and supplies—sheeting.
- 854. Materials and supplies—concrete pipe and tile.
- 855. Materials and supplies—metal culvert.
- 856. Materials and supplies—sand, gravel and stone.
- 857. Materials and supplies—waterproofing.
- 858. Materials and supplies—hand rail.
- 859. Materials and supplies—paints, oils, brushes, etc.
- 860. Materials and supplies—
- 861. Materials and supplies—fuel, light and water.
- 862. Materials and supplies—piling.
- 863. Materials and supplies—hydrated lime.
- 864. Materials and supplies—temporary building.
- 865. Materials and supplies—pumping and pipe line.
- 866. Materials and supplies—expansion plates.
- 867. Materials and supplies—test pits, borings, soundings,
etc.
- 868. Travel and livery.
- 869. Legal expense.
- 870. Purchase of equipment.
- 871. Rental of equipment.
- 872. Telephone and telegraph.
- 873. Freight and express.
- 874. Advertising.
- 875.
- 876. Workmen's Compensation Act.
- 877. Contractor's earnings.
- 878. Rental of site for plant and materials.
- 879.
- 880. Prorated charges—construction and maintenance
(camp).
- 881. Prorated charges—construction and maintenance
(corral).
- 882. Prorated charges—construction and maintenance
(mess).
- 883. Prorated charges—industrial railway operation.
- 884. Prorated charges—general.
- 885. Depreciation on equipment.

BINDERS AND FORMS FOR FIELD AND OFFICE

Books and Forms, and Their Use

In the operation of this system of accounting there should be as few books and forms of record as possible to accomplish results in the most simple and effective manner with a view to making permanent as many of the original records as practicable. On new work there should be some central control to censor all forms suggested for adoption and to stop the tendency to turn out forms suitable for one portion of a project only, when by a slight change the form could be made just as valuable for that particular work and also to cover numerous other similar features.

A standard size, or several standard sizes for forms will be found very effective in most offices. That is, when a new form is worked out, select a size that will fit one of the binders in use, or one of the filing card cases. More than one standard size may be required. Making forms into odd sizes is a cause of trouble from nearly every angle. A little thought on this subject will make it possible, nearly always, to either enlarge the prospective form a trifle, or make it smaller to fit some size already in use. One advantage of having standards is that in the field where many different forms are used, a very few of each, possibly one or two binders and one card index box will take care of the needs of a fairly large force. In the field when moving is frequent, every pound of

extra luggage is a handicap. There are, however, many other advantages in having standard sized forms.

Try Temporary Form Before Definite Adoption

When a new form is contemplated, a good precaution is to try out a temporary pencil ruled sheet for a short time to see how it works, filling it in exactly as the requirements of the work make necessary. A short trial use of the average form will frequently suggest changes and additions. A form made in this manner is likely to be of the most practical nature.

Frequently long study and some expense is put on a form which, when actually used, does not answer the purpose at all. A form, if it is worth having printed and put into use, should be of sufficient value to warrant study by a man of practical experience to insure its meeting the purpose desired. A good form properly censored is a big labor saver on construction work, but like all things, good or bad, form-making should not be overdone. When the principle of the account number system is thoroughly understood it will be found that numerous forms considered indispensable on construction work can be very nicely eliminated and the same, or possibly more valuable information gained through a summary of account numbers on a blank sheet.

TIME BOOK SHEETS

Plates Nos. 1, 2 and 3

(Explanation.—Key to the numbers shown on plates above referred to. The plate was originally used in the former edition of Costkeeping and Construction Accounting. In this edition the numbers have been revised somewhat to make them more compact and of a more general nature. The numbers used on plate 1 are for the following items. See page 80).

Feature—"Construction and Operation of Blacksmith Shop"

- 291. Labor, materials and supplies—construction of building and setting up equipment.
 - 286. Labor—blacksmith.
-

Feature—"Right of Way"

- 372. Labor—clearing land (by hand).
 - 376. Labor—fencing.
 - 378. Labor—fighting fire.
-

Feature—"Construction of Sub-grade, and Spreading and Rolling Crushed Rock and Gravel"

- 417. Labor—plowing.
 - 418. Labor—excavation (hand).
 - 422. Labor—ditching and draining.
 - 425. Labor—disposing of slides.
 - 438. Labor, materials and supplies—road grader work.
-

These items will be found under the respective features in the account number book section, but under different numbers.

Plates 1, 2 and 3 on the following pages show portions of timebook after having been completed

and ready for payment of services. Plates 1 and 2 show the front and back of the timebook sheet. These sheets, when fastened together, form a continuous book, time of employe to the 24th of the month appearing on the first sheet and the balance of his time record on the back of sheet No. 2, and in this manner running through the book so that when the timebook is opened a man's complete record of time follows across the two pages as though it were one long sheet.

Plate No. 1

This shows badge number assigned to man, name and occupation of employe, account numbers under which he is working, the time to 24th of month; also it shows the sheet number of timebook, month, year and the symbol under which the work covered by this timebook is done.

Badge Number

When the mess is operated on work of some magnitude and changes in employes are frequent, it is sometimes considered of advantage to identify each man by a badge, which is given when he is signed up for employment and the number of which is entered opposite his name in the timebook. The men are also given notice that no one may enter the dining room without this badge, and that each man will be charged with every meal served while the badge is in his possession. If he is to miss several meals at the mess and desires credit, he must report to the timekeeper and leave his badge before the first meal (which he expects to miss) is served. The meals served while that badge is in the possession of the timekeeper he

Form No. 1		TIME BOOK November 1916												Prefix "gd"												
SHEET NO. 10		Month																								
No.	NAME Occupation	Account No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
344	James L. Roberts	372	X	X	X	X	0	4	6	4															X	
	Laborer	378						4	X	2	3															
		418									X	1														
		425											X	0	X	X	X	X	X	X	X	X	X	X	X	
380	William Gates	417																								
	Teamster with team	422																								
		438																								
562	Robert J. Lane	491	X	X	X	X	X	X																		
	Blacksmith	286																								

Plate 1.—Full size, 8x5½ inches. Time book sheet. See Plate 2 for reverse side. When leaves are bound in cover and book opened a continuous record of each man's time is shown. For key numbers, see note under "Timebook Sheets," page 78.

will not be charged with. The result in a great measure is the elimination of annoying arguments as to whether or not a man has due him credits for meals missed, when without the badge there might be considerable doubt as to whom meals were served. If these badges are lost a charge of \$1.00 is made against the employe.

Plate 1 gives a graphic example of the segregation of time. It will be found that these three men were employed on various features, and the plate shows how easily, by the use of the numbers, the segregations are made, with the account number book as a key.

Plate No. 2

This is a continuation of Plate No. 1 and shows the manner of inserting rates and charges. It will be noted that James L. Roberts received \$2.00 per day for all his work except that time spent fighting fire, which is paid him at the rate of \$2.40 per day. The last item shows the method of handling monthly rates and at the bottom of each sheet, at the close of the month, is carried the totals of columns. In the "Amount Earned" column is carried the segregation of charges to each account number. In the "Total Earned" column is a total of each man's earnings for the period employed. "Meal Tickets" include charges for meals served at the camp mess. "Orders on Store" covers all purchases from camp commissary and mess supplies. "Rent and Hospital." It is customary on many construction jobs to contract for the services of a physician and hospital facilities. A small monthly charge is made against each employe,

	25	26	27	28	29	30	31	Total Time.	Rate.	Amount earned.	Total earned.	Meal Tfrs.	Orders on store.	Rent and Hoop.	Total deductions.	Amount due..
X	O	X	X	X	X			6 $\frac{1}{2}$ Days	2.00	13.50						
								" "	"	14.50						
								1 $\frac{1}{8}$ " "	2.40	2.70						
								" "	2.00	12.00						
								5 " "	"	10.00						
											52.45	22.50	7.50	1.00	31.00	21.45
								9 $\frac{1}{2}$ Days	4.40	41.80						
								10 $\frac{1}{4}$ " "	"	45.10						
X	Z	X	X	X	X			5 $\frac{1}{4}$ " "	"	23.10	11.00	18.75	10.25	1.00	30.00	80.00
								6 $\frac{3}{4}$ Mo.	150.00	30.00						
X	X	X	X	X	X			2 $\frac{1}{8}$ " "	"	105.00	135.00	20.50	8.50	1.00	30.00	105.00
Totals										297.45	297.45	61.75	26.25	3.00	91.00	206.45

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Plate No. 3

At the close of the month each item should be completed and the amount due extended, columns of the timebook sheets totaled and a recapitulation

HIGHWAY COMMISSION

November Timebook - 1916.

25	26	27	28	29	30	31	Total time	Rate,	Amount earned	Total earned	Meal tickets	Orders on store	Rent and hospital	Total deductions	Amount due																																																																										
Summary of Account Numbers																																																																																									
<table border="1"> <thead> <tr> <th>Acct. No.</th> <th>Amount</th> <th>Page</th> </tr> </thead> <tbody> <tr> <td>151</td> <td>185 00</td> <td>1</td> </tr> <tr> <td>152</td> <td>204 00</td> <td>2</td> </tr> <tr> <td>212</td> <td>142 80</td> <td>3</td> </tr> <tr> <td>250</td> <td>86 91</td> <td>4</td> </tr> <tr> <td>266</td> <td>51 18</td> <td>5</td> </tr> <tr> <td>286</td> <td>105 00</td> <td>6</td> </tr> <tr> <td>291</td> <td>30 00</td> <td>7</td> </tr> <tr> <td>372</td> <td>88 20</td> <td>8</td> </tr> <tr> <td>376</td> <td>102 01</td> <td>9</td> </tr> <tr> <td>388</td> <td>20 10</td> <td>10</td> </tr> <tr> <td>417</td> <td>41 80</td> <td></td> </tr> <tr> <td>418</td> <td>72 00</td> <td></td> </tr> <tr> <td>422</td> <td>64 00</td> <td></td> </tr> <tr> <td>425</td> <td>91 84</td> <td></td> </tr> <tr> <td>438</td> <td>286 00</td> <td></td> </tr> <tr> <td>445</td> <td>85 20</td> <td></td> </tr> <tr> <td colspan="2"> 1656 04 </td> <td></td> </tr> </tbody> </table>																Acct. No.	Amount	Page	151	185 00	1	152	204 00	2	212	142 80	3	250	86 91	4	266	51 18	5	286	105 00	6	291	30 00	7	372	88 20	8	376	102 01	9	388	20 10	10	417	41 80		418	72 00		422	64 00		425	91 84		438	286 00		445	85 20		1656 04																						
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Plate 3.—Full size, 8x5½ inches. Timebook sheet, showing recapitulation of timebook by pages and summary of account numbers. This is one of back sheets and bound in timebook at close of month.

made by pages, as shown on this plate. A summary of account numbers should also be taken from the items of the timebook, the totals of each account number to which charges have been made during the month collected and the summary of the totals charged against each number listed, as shown on Plate 3. This total of account numbers and the total of the "Total Earned" (column 1) of the recapitulation of the timebook by pages should be the same. If the extensions of time worked are made correctly this is a pretty good check as to the correctness of the balance of the timebook. After this summary is made the one in charge of that particular unit which the timebook covers should certify to the correctness of items and segregations.

Permanent Record is Secured

With the account number book as a key, this makes a record of each employe's services for all time. If the general office and camps are located a considerable distance apart, this record enables the general office employes to check up any man's time from day to day, and determine exactly what he has been doing. This is of advantage occasionally when disputes arise as to time worked, when men appear at paymaster's window with time-check. The employe's memory may be quickened by a statement by days as to just what he was doing and many times he remembers that just after a certain job "it rained and the crew laid off half a day," or "he cut his foot on that job and was off two and one-half days," etc., items which he had overlooked when making claims for addi-

tional time. These are all small matters, but on construction work the lack of adequate and definite information, especially when the main office and the job are separated, means the spending of considerable time looking for information, at a season of the year when the element of time is of the greatest value.

Plate No. 4. Form No. 2. Timecheck Form

Timechecks are issued by the timekeeper to the employes when services are terminated. When a timecheck is issued the time in the timebook should be closed in the same manner as would be the case ordinarily at the end of the month, and a notation entered "Timecheck Issued," or, if no rubber stamp is provided, the notation in large colored pencil "T. C." is sufficient. On receiving payment on timecheck the employe endorses the back of the timecheck as a means of identification.

The account numbers designating the work done by the employe and the amounts charged to each should be listed on the back of the timecheck, to enable the general office to make proper entry. (This procedure is not necessary, however, if the general records are kept at the same office in which the timebook is kept, as the bookkeepers can then secure necessary information from the timebook itself).

When the timebook is closed and sent to the paymaster for payment, he should carefully check back the payments made on account of timechecks issued, with the accounts in the timebook marked "T. C." to see that they are identical with the amounts paid on timechecks. After a timecheck is

Time Check No. 501

Time Book, Page No. 10

Nov. 30, 1916

Name William Gates

Total Time 25 days — hours

Amount earned . . \$ 110.00

Total Deductions . 30.00

Amount Due . . . \$ 80.00

Form No 2

TIME BOOK
PAGE No. 10

HIGHWAY COMMISSION

TIME CHECK No. 301
PAID BY CHECK No. 723

Symbol 9d DATE Nov. 30, 1916.

THE STATE OF OREGON, To William Gates, Dr.

For services as shown below during the month of November, 1916.

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Time	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Employed as Team Teamster from 3 to 30, 25 days at \$ 4.40, Earned, \$ 110.00

Employed as _____ from _____ to _____, _____ days at \$ _____, Earned, \$ _____

DEDUCTIONS FOR SUBSISTENCE, ETC.			
Subsistence	Orders on Store	Rent, Lodging	Hospital Dues
<u>18.75</u>	<u>10.25</u>	—	<u>1.00</u>

Amount Due Eighty dollars and none cents, \$ 80.00

Signed in presence of Timekeeper:

William Gates Payee
Henry O. Kenworthy Resident Engineer

James L. Henderson Timekeeper

NOT TRANSFERABLE

Plate 4.—Full size, 9 1/2 x 3 7/8 in. Timecheck form issued to employees desiring payment of wages before close of month. These are made up in books of 25 each.

issued in the field that account in timebook should not be changed by the timekeeper, even though an error has occurred, without the sanction of the paymaster and proper adjustment in all accounts affected. It is important that the paymaster on each payday compares the grand total of the timebook against a total of checks issued against timechecks and timebook entries. These, of course, should balance before regular monthly checks are passed out.

Plate No. 5. Cost Ledger Sheet. Method of Assembling Charges to Account Numbers

A "Classification Book" is opened for the assembling of all charges monthly. The book is made up of loose sheets standard size, $8\frac{1}{2} \times 10\frac{3}{4}$ inches and consists of several ruled columns on both sides of sheets. Each feature is given a sheet (both sides). For instance "General Field" Nos. 151 to 195 is entered and both sides reserved for entries to this feature. All charges against items Nos. 151 to 195 are assembled on this sheet; each individual item, carrying all charges against it from whatsoever source they may come, either timebook, invoice, storehouse, or other sources. The charges on the summary sheets are totaled by items and a grand total of items and features taken. When the classification book has been balanced with the totals of all records from which the summary is made, it should be carefully bound, labeled and filed for future reference as one of the permanent records.

On many projects, it may happen that the record of segregations in the "Classification Book" is sufficient for all purposes. The smaller units

OFFICE OF
STATE ENGINEER-HIGHWAY DEPARTMENT

Summary of Charges to Account Numbers.
November, 1916. Vouchers 1390 to 1500.

Symbol	Account Number	Amount		Symbol	Account Number	Amount	
3d	151	150	00	36	1	250	00
	153	75	00		2	200	00
	155	60	00		6	189	00
	159	15	40		11	41	78
	166	9	80		17	8	96
	171	2	00		21	12	00
	187	15	00		29	1	00
	204	17	89		43	196	00
	374	876	57		48	30	00
	382	502	00		49	6	50
	402	910	00		54	4	10
	408	52	00		56	410	00
	432	89	62		57	82	00
	444	56	90		59	37	50
	478	71	96		78	10	00
	507	160	20		91	198	00
	509	17	80		103	96	00
	514	3	86		112	10	00
	542	110	00		115	42	00
	543	218	96				
	556	76	00	36	Total	1824	84
	557	15	00				
	563	21	00				
	602	78	62				
	619	81	16				
3d	Total	3686	74				

Plate 5.—Full size 4½ inches by 7¼ inches. Cost ledger sheet, condensed form. Monthly costs are assembled on this sheet by features.

have answered their purpose in the field and from the close of the month on the only segregation desired is by features, which are posted in one lump sum feature by feature in the "Cost Ledger Book" and carried in this manner.

On other work it may be considered advisable to carry these charges by feature items until the close of the work. Plate No. 5 shown illustrates the latter treatment, that is, the carrying of all charges on the cost ledger by items. A reason for carrying segregation by items in the general office instead of by features only, is that on some work it seems desirable to send monthly cost figures to the Division Engineers in the field which, from the general office viewpoint, are final and correct, and include items charged against his work of which he may have no record. Or, in the rush of his work and lack of good office equipment, such as adding machines, etc., he may have made some error in listing and not have a true record of his cost items.

Cost Items May Be Blue Printed and Sent Field Men

Plate No. 5 shows a sample cost ledger sheet, pocket size on thin tough paper. Entries are made in India ink, the record may be blue printed and all sheets affecting the various divisions sent to the Division Engineers immediately on closing the books each month. It is presumed that he has kept a record day by day during the month from the data which has passed through his hands. Practically everything should go through his hands for this purpose, except certain overhead charges which may be assessed against

his work and a few other charges which are of such nature that they can only be settled intelligently by the general office. The sending of a true copy of the final and completed cost ledger sheet to him monthly gives him a definite knowledge of just what is charged against him in the general office and of his standing as to costs. By being blue printed from the permanent record, time is saved that re-copying would entail, and there is also a certainty that the figures sent to the field correspond identically with the office records. If the field engineer believes his work is carrying charges which should not be assessed against it he has opportunity monthly to take the matter up with the proper authority and have the merit of the charges settled. He has an opportunity to protect himself against errors in the general office which may be to his disadvantage. At the same time the general office is in position to explain any apparent errors or overcharges while the entire matter is fresh in the minds of all and perhaps produce data which bears the approval of the field engineer and which has slipped his mind, temporarily. This process puts both field and office on their mettle, and it is believed creates a better feeling between them. The feeling by some field men that the office can "make or break" their good records is eliminated.

Field and Office Are Dependent on Each Other

The general office works with the knowledge that if a "bonehead blunder" is pulled in compiling cost charges, the engineer will undoubtedly catch it. This has a healthy tendency towards more care

in assembling charges against features than might otherwise be the case. A congenial relationship between the office and field forces is of the utmost importance if the maximum of efficiency is to be secured. Unhappily this relationship does not always exist and it is believed that the cause is largely because of a lack of understanding of each other's responsibilities.

Engineer Must Have Definite Cost Items

Sometimes the general office assumes the attitude that it is none of the field man's business as to the manner in which the office records are assembled. This is a very sad mistake. The manner in which charges against his work are assembled is absolutely vital to the field man if he is to maintain a pride in his work and keep the enthusiasm of his men at such a state as to produce the maximum of results. The field men should be encouraged by a true unbiased periodical statement of costs and through this medium assisted in reducing them by increasing the output. Every human being must have some incentive to encourage the best that is in him and to the average engineer or construction man this incentive is very largely a true record of just what he is accomplishing. This gives him something tangible to "better" and by which to gauge his work day by day.

These monthly sheets may be summarized and assembled each quarter (three months) or more frequently if desired. The prefix is the controlling factor on each feature as that positively identifies the work and location of it.

The cost ledger items are of course supported by data furnished from the engineering report of the work, showing yardage, and other quantities common to construction work. The entries in the classification book may be made continuously through the month as invoices are rendered. It is a good custom for the invoices to be immediately sent to the field for approval, where the approval is handled in that manner (if no regular purchasing department is maintained) and the field man check off the goods from his receipt form, insert the proper charge and return immediately to the general office. This allows the general office to spread its work over an entire month, instead of having a rush at the close of the month which tends towards errors and poor work. No work should be left until the close of the month except that which is absolutely necessary and cannot be handled at other periods. The competent office manager will arrange his work so that the bulk of it is taken care of day by day through the month.

(Note.—See further reference to this form following description and use of form on Plate No. 6, page 94).

Plate No. 6. Large Size. Cost Ledger Sheet

While in most cases the small size of cost ledger sheet is preferable, there is a place for the larger form, as shown by Plate No. 6, and on some work it may have advantages over the smaller form. This would apply on the larger projects, where a general office with a full quota of assistants is maintained and condensing of records is not considered important. The plate shows the first numbers of "Camp Construction" feature and the

Form No. 4.

STATE ENGINEER—HIGHWAY DEPARTMENT

COST LEDGER

CAMP CONSTRUCTION PACIFIC HIGHWAY
(Includes office, bunk houses, etc. only)
Numbers 206 to 240. Prefix "9d".

Account Number	CLASSIFICATION	Month of 1916.		Month of 1916.		Month of November 1916.		Account Number
		This Month	Total to Date	This Month	Total to Date	This Month	Total to Date	
206	Salaries, Engineering	192.50	192.50	6.00	198.50		198.50	
207	" Drafting	75.00	75.00		75.00		75.00	
208	" A. & T.	15.00	15.00	12.40	27.40	6.00	33.40	
209	" Miscellaneous	18.75	18.75	3.10	21.85		21.85	
210								
211	Labor, Superintendence	175.00	175.00		175.00			
238		207.68	207.68	31.90	239.58		239.58	
239								
240	Depreciation on Equipment					3.90	3.90	
	Totals	1065.03	1065.03	167.85	1232.88	118.90	1351.78	

Plate 6.—Full size 8½ inches by 10¾ inches, cost ledger sheet for large projects. (Items 196 to 225 under camp construction feature correspond to those used above under "Account Number" column. No. 206 corresponds to No. 196 on page 51 and so on through the feature).

final totals of the sheet. This sheet is followed in the cost ledger book by an insert printed on both sides, with space for entries for six months, and ruled in the same manner as Plate No. 6, except that the space for classification and account number is left off. The classification and account number entered on Plate No. 6 answers for all insert sheets which are bound into the book for as many months or years as the work may continue.

**Plates Nos. 5 and 6. Relative Merits of
Cost Ledger Sheets**

The small sheet (Plate No. 5) is in use by the Oregon State Highway Department and for the nature of the work in this state is considered to have many advantages over the larger form. A summary of costs by features are sent monthly to each of the men in charge of sections of the work. The original copy is made on a tough thin paper and blue prints made from it for field use. This makes a small, compact record which is considered of importance. On public work the chief accountant is occasionally called upon to attend meetings of interested citizens who have a habit of asking questions on every subject imaginable connected with the work, and on financial matters they expect, and should be given, an immediate answer. To satisfactorily do this it is necessary to have practically a complete set of the cost ledger figures, and this is only possible and practicable by having them on a condensed form from which blue prints can be made, otherwise it would not be advisable to take the only set of books from the general office. Another advantage in the use of

the smaller form is the small expense of printing and the lack of waste in its use.

The cost ledger sheet shown on Plate 6 is carried on heavier paper and it is not intended to make blue print copies of this record, although there is no reason why the form could not be made up on a thin tough paper and blue printed, the same as Form No. 5. This requires a little more labor in its preparation and is suitable for larger projects.

Plate No. 7

This plate shows form No. 7, "Register of Checks" which is simply what the title indicates—a register of all checks written. A voucher is prepared covering each account, or a number of invoices to one firm, and after approval of the account by the proper authority, a check is written. As all segregation is on the voucher, there is no necessity of a segregation on the check register. It is checked against the total of vouchers issued and paid.

Form No. 12, "Voucher Register," is also shown on this plate. A voucher form which is of heavy paper and on which all invoices to be paid to one firm for a given period are attached, is prepared and approved, by the proper authority, for payment. A space is provided on the back of the voucher form for the number of check, the date, bank and fund on which drawn, amount of check, and a summary of charges by account numbers to which the items on the voucher should be charged. The vouchers are numbered consecutively and then listed on "Voucher Register" together with the number of the "warrant" or "check" by which

[illegible][illegible]

Plate 7.—Full size of each form 7 and 12, 8½ inches by 10¾ inches. All checks are listed as issued, on check register, and all vouchers are listed on voucher register. Total of voucher register for each month must check with totals of cost ledger by features for month.

payment is made and the symbol number of job to which charge is made. Only the aggregate charge to the job as a whole is made on voucher register, the units are shown on the voucher itself and the larger amount as shown on the voucher register is used as a quick check against the jobs in the closing of the monthly accounts, to see that the summary of all the smaller items correspond with the larger totals. This in a measure is used as a check to catch and correct errors in assembling items which may have been listed under improper prefix numbers or jobs, and gives the chief accountant a guide as to the correctness of the numerous items assembled by the costman. The check register, it will be noted, has a column for "Voucher Number." This gives a good cross reference to each account paid. Both checks and vouchers are filed consecutively in separate files—no attempt is made to file the voucher and check, by which the account is paid, together. It is believed that separate files are more satisfactory. The totals of the cost ledger, and of the voucher register should agree. (If a storehouse is maintained—then requisition charges should be considered also. See statement under storehouse). A total of the check register, and of "vouchers paid" should agree. It is quite probable that monthly cost figures will be made up of both paid and unpaid vouchers. (Obligations created during a certain month, which may not necessarily be paid during that period, but which have a bearing on the cost record for that month would be used, as in assembling costs no attention is paid to the payment of accounts. Labor, material and supplies

USED is the only basis on which costs are assembled).

On the payroll accounts, where several funds are used, it has been found of considerable assistance to use a different bank for the depositing of the various funds, and a different colored check for each fund—each color of check numbered consecutively from No. 1 and a section of the check register reserved for each different color of check. This enables the accountants to keep every fund absolutely separate and is considered “fool proof” as nearly as such a thing may be accomplished.

The checks written on the regular invoice accounts prepared on vouchers may be handled in this same manner if conditions are favorable.

Plate No. 8. Form No. 6. Personal Ledger Card

This card is found more convenient in handling personal accounts than a bound or loose leaf ledger. It is arranged alphabetically in a box file or the drawer of a desk. At certain periods, usually quarterly, those firms with whom there has been no dealing for the quarter and with whom, so far as is known, there will be no more dealing, are placed in a “dead file.” This leaves a “working file,” convenient to handle, and makes a very compact, easily kept record, and if carefully kept prevents duplication of payment of accounts.

This form is used on both state and county accounts when they are both handled in the one office. Information under “Road or Bridge” makes available a quick summary of charges against the two departments with little work. “Memo of claim,” calls for an insertion such as “Hardware,”

"Equipment," Mess House Supplies," "Travel Expense," etc., etc. "Date of first charge." Here is entered date of first charge appearing on an invoice on which is listed a number of charges running over a period of time. "Date of Last Charge." Here is listed the last charge on the invoice referred to above. Should a subsequent invoice be received on which there appears charges between the dates shown on a previous invoice as listed on the "Personal Ledger Card" then the voucher clerk looks up his previous voucher, compares the items with those on the subsequent claim and in this manner detects duplications and prevents a second payment of the account. This form, of course, may be modified to fit the special needs of any project and may be made smaller if some of the information shown here is not considered of value, or enlarged if other data is considered pertinent to the work. The intent of the card, as the name implies is chiefly to cover two things, give a condensed record of dealing with a certain firm, and to prevent duplication of payments of accounts.

Plate No. 9. Form No. 9. Messhouse Report

The items on this form are self-explanatory. It is intended to show the status of messhouse operations from month to month as well as to date.

On the mess house report there is contained sufficient segregation to make it possible to quickly detect the difficulty where costs are at variance with previous records. The items are taken from the numbers shown under "Messhouse Construction and Operation" feature, Nos. 225 to 245 and assembled in the manner indicated by headings on

Form No. 10

HIGHWAY COMMISSION

Report of Comparative and Average Unit Costs of Mess House for the Month of 191....

CANP	MAN DAYS	TOTAL		SURVIVENCE		LABOR		SUPPLIES		THIS MONTH		TOTAL TO DATE	
		COST	UNIT	COST	UNIT	COST	UNIT	COST	UNIT	LOSS	GAIN	LOSS	GAIN
inactive messes													
Distributed loss or gain													
Total cost													
Average unit cost													

Remarks:

Prepared by:

Correct:

Buckley

Civil Club

101

Low Costs and Best Meals at Same Camp

Usually the low costs, and the "good meals" are found at the same camp, which indicate that high costs are most frequently due to a lack of knowledge of the fine points in cooking, rather than to any other cause, except that where a small crew is maintained labor costs may be excessive. However, the above is seldom acknowledged as a "reason" by the cook. With him, like a good many human beings, if costs are excessive, it is always the "Purchasing Department's fault," "poor fuel," "stove is no good" or some other equally good (?) reason. It remains a very peculiar fact, however, that almost always the camp which has the lowest mess costs is the one to which the men flock when they want a first class meal; which entirely shatters the theory that because the management desires and insists on reasonable costs in the mess house, it is necessarily trying to "starve" the men. A meal that is poor is expensive at any price, regardless as to its cost in dollars and cents and the management always pays high for poor and improperly served food. Sometimes this "high cost" to the management is not apparent inasmuch as the mess statements show a profit. The cost is there nevertheless and it comes through the inefficiency and lack of pep in the workman who feels that he is poorly fed and "soldiers" on the job. The mess operation sheet may show, theoretically, a profit, but the yardage costs of the superintendent tells the other side of the story and he stands the "loss" which is not indicated on the mess report.

A Steward's Pride

A good steward in construction camps who has at heart the real interest of his employers will not take so much pride in the profit to be shown on his mess report, as he does in the reports he may hear of his mess, the satisfaction of the workmen with what he is serving them and the manner in which the food is cooked and served. This does not conflict with the statement made above that economy in operation should have close attention and a profit over what the men pay for their meals shown if possible, but the first and most important consideration at all times is the supplying of a good substantial, well cooked, sanitarily served meal, well balanced and in as pleasant and agreeable environments as possible. The manner in which a meal is served has an important bearing on its food value.

Everyone Kicks on the Cook

As is well known by those who have had experience in the operation of camps, the mess house is nearly always the "buffer." It is always perfectly legitimate to complain about the cook when there is nothing else to make a louder noise about and many times this is not entirely justified, but very many times it is partially so and anyway, if the men feel that they have a complaint on account of their food this matter should have prompt and energetic attention by the management. It is a very difficult matter to explain to some cooks that economical operation of the mess house does not mean putting less on the table. That real management of this department really means a little more headwork, the arranging of meals for a

period in advance in such a manner as to make the most advantageous use of the "left overs" from each meal and to continually change the bill of fare. That the dishes must be washed clean and thoroughly, rinsed, and that old chipped enameled ware should not be used. It always looks dirty after becoming chipped. The fact that the men are doing dirty work and are perhaps unclean themselves, does not mean that they do not appreciate cleanliness in the mess house, or that filth there goes unnoticed.

A method of securing more efficiency in camp cooks which has been condemned more or less because its operation was misunderstood, but which has worked in many places with the greatest of satisfaction, follows:

A Sliding Scale for Cooks

A sliding scale for salaries of cooks is adopted with a minimum guaranteed monthly rate. If the meals for the month cost exactly what the men pay for them, the minimum salary is all the cook receives. For each cent per meal under the price paid by the men, he receives a certain bonus; the amount to be determined by the number of meals served.

The All Important Factor

It is understood first, however, that the wage paid in every instance depends altogether on the class of meals served, the cleanliness of the kitchen and dining room, and that the cook will not be tolerated if any serious complaint from the men is found to be based on facts. In other words, if meals are not satisfactory to the men, the cook

has to go and this is the most prominent and outstanding condition in offering him the inducement of a bonus.

Charges Against Mess

The charges assessed against the mess include the food stuffs furnished to which a certain percentage is added over actual invoice price to cover handling and freight charges from railroad station to camp, the cooks' and helpers' wages, the initial cost of construction of mess house and dining room. (This charge spread over the period of months in which the mess house is estimated to be necessary and a monthly charge is arrived at). All fuel, oil, etc., cost of all other expense pertinent to the operation of the mess house, such as root house construction, meat house, digging of wells, cesspools, etc., etc.

Real Profit From Mess House Operation Does Not Necessarily Show on Mess Reports

The real profit to be derived from mess house operation on any construction work comes from keeping the men in good humor and satisfied with their treatment. It is believed that a considerable portion of the credit for reasonable costs on construction is due and should be given to the management of camp messes where it has in mind all the time the broad view of the matter which keeps it from unduly attempting to build itself up through the medium of a good figure on the profit side of mess reports, but is willing to look to the completed project as a whole for its credit and take its pleasure in the knowledge that it is in an unselfish manner, partly responsible for good

STATE ENGINEER—HIGHWAY DEPARTMENT

Film No.

Report of comparative and average unit cost of Corralis for the month of _____, 19__

CAMP	HORSE DAYS	TOTAL	FORAGE		LABOR		SUPPLIES		Pounds Per Horse Day	
		COST	UNIT	COST	UNIT	COST	UNIT	HAY	GRAIN	
Total cost										
Average unit cost										

Prepared by:

Buckeyeer.

Chief Clerk.

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Plate No. 10. Form No. 8. Corral Report

The items on this form are self-explanatory and show the status of corral operations from month to month.

Where team work is being done a corral report becomes as necessary as a mess house report to see that too much or too little forage is not being furnished the stock, and to learn the real cost of operation of corrals. Stock, like men, must be taken good care of if the maximum is to be expected from them. A real stock man who has had experience with teams and has been "brought up with them" usually will take better care of his stock than of himself. This type of man, however, is not always available.

Plate No. 11. Form No. 10. General Ledger Sheet

This plate shows a sample of the general ledger sheet covering allotments and expenditures in one section for the entire year. The form is small, but the space is ample and at all times gives a definite record of the status of funds under each section. At the close of each month a financial statement is made, listing accounts by feature and sections, which covers the ground very thoroughly. The original form is on thin paper copied in India ink from which blue prints may be made so that a duplicate set of records is available for field use, as well as an original and a working set on blue print paper in the office.

Manner of Handling General Ledger Accounts Vary

The manner of building up general ledger accounts will, of course, vary. The outline and form of items carried in the account number book, the

STATE ENGINEER-HIGHWAY DEPARTMENT

○ General Ledger 1916 Funds.
Symbol "9"

Douglas County (see minutes S.H.C.
Mar 1, 1916)

Allotment \$ 25000 00

Expenditures 1916	Month.	Amount.			
Cost Ledger Totals	April	654 90			
" " "	May	2462 10			
" " "	June	3562 80	6	679 80	
Balance July 1,			18	320 20	
Transferred to Josephine Co. (see S.H.C. minutes June 28, 1916)		7500 00			
Cost Ledger Totals	July	3876 59			
" " "	Aug.	2568 51			
" " "	Sept	2181 18	16	126 28	
			2	193 92	
Additional allotment to Douglas County (see S.H.C. minutes Sept 30, 1916)			6	200 00	
Balance Oct 1,			8	393 92	
Cost Ledger Totals	Oct	2325 40			
" " "	Nov.	1896 42			
" " "	Dec.	3218 96	7	440 78	
○ Balance Jan 1, 1917			\$	953 14	

Plate 11.—Full size, 4½x7¼ inches. Charges against each section (or fund) are assembled on this sheet with necessary explanatory notes from minute book of State Highway Commission and cost ledger totals.

nature and number of funds available and the general scope of the work to be handled have a very material bearing as to the number and nature of the general ledger accounts. The detail is largely carried in the cost ledger, equipment record book, storehouse record book and classification book. The page shown on Plate 11 illustrates the handling of a general ledger account, where the work is done by "allotments" by the State Highway Commission partially and where allotments are partially controlled and designated by law. In this case it was important to keep the general ledger records in this manner and have them tied to the "Record of Minutes of the State Highway Commission." The small form used as a "General Ledger Sheet" has given ample space for all information necessary and proved very convenient to handle. As work was completed at certain periods (once a year seemed to be the best suited on this particular work) the accounts shown as completed in the general ledger book were taken out and firmly bound into a small book properly labeled and indexed and filed away with permanent records for future reference. But a very small space is required for these records and they are easily and quickly available at any time.

The Handy Pocket Binder

This sheet (general ledger sheet) and the cost ledger sheet, equipment record sheet, and small tool record sheet, are all of the same size and will fit binders in common use by engineers, such as "Morden's Loose Leaf Book" No. 6; "De Luxe Memo Books" Nos. 110 and 205, or any other pocket binder taking a $7\frac{1}{4} \times 4\frac{1}{2}$ inch sheet. A con-

venient pocket size. The office binders are used with the one-inch rings. This form seems to answer the purpose as well on projects of several millions of dollars as it does on smaller ones. The only difference in treatment on the larger projects is that more sheets and proportionately more binders may be necessary. The general ledger sheets may require two binders on the larger projects instead of the one which is sufficient for smaller projects, although frequently the only difference between the larger and smaller projects on construction work is that the amounts charged to the various features are larger and the general accounts carried are very much of the same nature, requiring practically no more book space than the smaller project with a varied number of features in operation.

Plate No. 13. Form No. 13. "Equipment Record Sheet"

Sheet printed on both sides—both sides shown on Plate 13.

Equipment Charges

The last item in each feature is "Depreciation on Equipment." There is also in each feature an item, "Purchase of Equipment." It is not intended that both of these items will be used on the same job. If the project is small, and on some of the larger work where only small equipment is necessary, it may be preferable to use the "Purchase of Equipment" item. If this method is followed, then at the close of the work, to arrive at a fair charge for its use during the period of construction, a physical inventory of equipment and appraisal of its value should be made and the item "Purchase

EQUIPMENT RECORD SHEET

VOUCHER NO. _____

DATE _____

(Full description of equipment should be listed on this side of form. If headings do not fit certain special equipment, ignore them. If several parts comprise equipment, list parts separately and then show total cost. On reverse side under column "charge to," should be listed the account number or feature to which depreciation is chargeable and length of time equipment has been used on that feature, as—

JUNE, 198 No. 2844 JUNE 1 TO JUNE 30th, 1919"

Rented equipment is listed in same manner as that purchased—instead of depreciation charges on back, the rental charge is inserted.)

DESCRIPTION OF EQUIPMENT

DATE OF PURCHASE _____

PRICE COMPLETE, F. O. B. \$ _____

FROM _____

ADDRESS _____

FREIGHT)

EXPRESS (CHARGES FROM _____ TO SALEM, ORE., \$ _____

TOWN.

EXTRA PARTS, REPAIRS, ETC.

(FORM 13)

RECORD SHEET

REVERSE SIDE OF EQUIPMENT

JUNE 1 TO JUNE 30, 1919)

NO. 2844

98

1

(JUNE

EXAMPLE

CHARGE TO

AMOUNT

MONTH

DEPRECIATION CHARGES

Plate No. 13.—Full size, 4½x7¼ inches. Each piece of equipment except "small tools" is listed on this form, one piece to each form.

of Equipment” under the proper features credited with this amount.

Use of Equipment Record Book

The use of “Depreciation of Equipment” item is recommended on larger projects where a storekeeper and property clerk are employed. There is started an equipment record book in which is listed all equipment purchased for the work as it is delivered to the storekeeper or property clerk.

Form No. 13, Plate No. 13 is self explanatory. As equipment is purchased it is listed on this form with sufficient descriptive matter to properly and permanently identify it. Also sufficient segregation at time of entry to indicate at any time by reference to this record, the purchase (invoice) price, freight paid on it—handling charges: whether or not extra parts were included with purchase price, and if so what, and their value. Date of receipt on project from whom purchased; whether new or second hand and any other information that may be of importance in the future. The intention of this form is to make it so complete that when the invoice is paid and filed away, it will not be necessary to again look it up, but that there may be available in the equipment record book (which it is presumed will always be within easy reach), all the information which might be supplied by a reference to the invoice. It is believed the arrangement of the present form will answer the purpose of listing most equipment; however, if occasionally it is found not suitable for certain pieces of equipment, rather than to attempt to fit the information to

the lines on this sheet, it is more important that this form should be ignored and insert the data necessary to give the information required and paste that sheet over this form. It is definite facts and information that is of value and not necessarily the following of exactly the wording of a certain form. A form can hardly be made to cover each and every individual case and if such is attempted, then the practical use of the form is usually very much limited if not made entirely useless. A form should be made to fit the majority of needs. Special items should be given special treatment rather than to attempt to make a form as elastic as some patent medicines are advertised to be.

Assembling of Depreciation on Equipment Charges

On the reverse side of this form it will be noted provision is made for the assembling of charges for "Depreciation."

On the larger equipment a certain estimated period of usefulness should be made, and this should also be done on groups of the smaller equipment. On this estimated period of usefulness is based the charge per month against the various features for "Depreciation on Equipment." On completion of the work, or at various periods during construction, an actual inventory is made of the equipment; a fair valuation put upon it, and adjustment made between this amount and the amounts which have been arbitrarily charged from month to month as "Depreciation on Equipment." If it is found the charges made monthly were too large, then "Depreciation on Equipment"

should receive credit sufficient to take up the difference; if too little, a charge to cover the deficit.

Small Tools

Small tools should be carried in one division of the equipment record book. This includes such equipment as shovels, picks, axes, blacksmith tools, hammers, saws and all equipment which is easily lost or soon worn out. Items of the same type should be assembled in groups and treated in lots rather than single units. The period of usefulness for this sort of equipment might be set at two to four months, depending on character of work. On gravel work a shovel might not last two weeks, while on other work small tools might last half a year. If the estimated period of usefulness is four months and the equipment costs \$240.00, depreciation should be charged to the proper item at \$60.00 per month. At the close of four months, when that feature of the work is completed, theoretically this equipment is entirely worthless. If this is not the case and \$60.00 worth of equipment is left, there should be entered on the final summary of costs a credit of \$60.00 against the item "Depreciation on Equipment," which makes the adjustment complete and the new unit of the work to which this old equipment is transferred takes the charge of \$60.00, which is entered upon the equipment record book covering the new feature and an estimated period of usefulness expected from this second-hand equipment is made and carried through the same as new equipment.

Large Equipment

If a steam shovel is used on the work its usefulness may be based on a period of three to four

years. If it cost \$4,800.00 and is estimated to last four years, the charge per month against "Depreciation on Equipment" to the permanent construction benefitted by the steam shovel work would aggregate \$100.00.

Repairs to Equipment

All repairs to equipment are charged direct to the feature on which the work is being done. After a period of three years, when taking a physical inventory of large equipment, it may be found that several parts which have been replaced during this period of service have put the shovel in such condition for all practical purposes that it is worth nearly as much as when it was purchased, or say \$3200.00, instead of \$1200.00, as the rate of depreciation would indicate. In such event, the features to which depreciation has been charged should be credited with their prorated portion of the difference between the estimated depreciation and the actual. If, on the other hand, the shovel deteriorates more rapidly than was estimated the "Permanent Construction" features should be charged additionally to cover the deficiency between estimated and actual period of usefulness of the machine.

Plate No. 14. Form No. 201. Stock Account Form.

Printed both sides. Both sides shown on plate.

Storehouse Operation

The operation of the storehouse is one of the very important features of the average construction project, and the position of storekeeper and property clerk, when combined, is a responsible

STOCK ACCOUNT

☐ JAM PLANT

☐ WOODBURN PLANT

PURCHASED FROM Conley & Smith ADDRESS Portland, Ind.
 DATE OF INVOICE May 2, 1919 SHIPMENTS FROM Chicago, Ill.

ARTICLE 500 sacks Diamond "A" sugar. Price job.
Chicago 8.95 Cwt. Freight allowance 22¢ Cwt
to Woodburn Oregon. Freight paid 32.28 allowance
110⁰⁰ - net prt lbg 202.87. Arrived good condition
May 21, Car C. O. No. 18721 Seal 424899.

OF CARLOAD LOTS GIVE INITIALS AND NUMBER OF CAR. SEAL NUMBER, ETC.

STOREHOUSE STOCK

RAW No. 2 MFG.

Date of Receipt	Quantity	Invoice Price	Freight & Express	Handling	Per-centage	Gross Cost	Unit	Price Per Unit	Remarks
May 21	50,000 #	4475	21287	1282	4425	47434	100	9.49	1% add.

WITHDRAWALS FROM STOCK

1919

[illegible]

FULL SIZE FORM 201 - 4" x 6"

Plate 14.—Stock account card. Size 4x6 inches. Printed on two sides. Both sides of card shown above. This is also used as a price card by purchasing agent and a perpetual inventory record.

place. Construction work frequently is located some distance from the jobbing centers and in the storehouse must be kept a reasonable amount of repairs to equipment, small tools and general supplies for the operation of the work, as well as a full line of groceries; frequently clothing and notions, tobacco and candies. The chief clerk should keep in very close touch with the advanced construction program of the superintendent of the work, and, insofar as is possible, anticipate the future need of supplies, materials, possible repairs to equipment and merchandise necessary for the proper handling of the messes and the mercantile stores, as well as the construction work proper.

Anticipate Possible Slow Deliveries

In placing orders provision should be made to counteract possible slow delivery, and every precaution taken to insure all goods reaching the storehouse in such time as not to delay work. Delays on construction are usually costly from several points of view, and the careful operation of the storehouse by practical men can in a large measure prevent some causes for delay.

The operation of the storehouse on a large project requires much study and constant planning as the work progresses.

When the project is of such size as to require the operation of a regular storehouse for the handling of supplies on the work a stock card on the lines illustrated on Plate 14 is recommended. This form should be modified to fit special conditions on the particular project for which it is intended. If the stock is segregated, the different

segregations may be shown as indicated on this card, "Storehouse Stock 1," "Raw," "No. 2" and "Manufactured Stock" which are the four segregations of the storehouse accounts for which this card was drawn. It will also be noted that this card covers stock in four different plants, "Loju," "Olympia," "Jam," and "Woodburn," a check mark in any one of those squares and a circle around the storehouse stock segregation, indicates that the stock is at that particular plant and of a nature as indicated by the stock number within the circle.

A Separate Stock Card for Each Item

As the stock is received into the storehouse, a card is made up for each item of stock. A full statement of facts connected with the purchase is shown; name of firm from whom purchase is made; date of purchase; date of arrival of goods; condition in which they arrived; freight allowance and conditions of freight payments; car number and seal number in case of carload shipments. The invoice unit price is shown in the heading and the invoice "gross price" in the body of the form.

The method of arriving at the "Storehouse" unit price is indicated on the card and it is the price at which the goods should be charged out of the storehouse. If ten cars of sugar were purchased and piled into the same space in storeroom at intervals of ten days or longer apart and none of this sugar was used until all ten carloads had been unloaded and it so happened that each car contained a different number of sacks and each carload also was billed at a different price, it would be possible by the proper use of this stock

account card to clear the storehouse and balance the stock account. If one card called for the delivery of 500 sacks of sugar at an invoice price of \$8.95 per cwt. f. o. b. Chicago, five hundred sacks of sugar, from the storehouse stock (this might be from any one of the different priced carloads in storage there) would be delivered and priced at the unit price shown on that card as belonging to this lot. This action would be continued with each card for each lot until the entire stock of sugar was charged out. In the end each car would be charged out on the basis of purchase price, freight and handling charges added. The above is an exaggerated example of the function of this card. On the reverse side is shown the withdrawals as they are taken from stock and the feature and number to which charges are made. Number 8 as a prefix under column "Charge to" would indicate "Camp No. 8" and "Mess House Construction and Operation" feature. Item 227 is "subsistence." The charge then is "subsistence to mess house camp No. 8."

A Percentage Added to Absorb Overhead

The "percentage added" column is for use in cases where a certain percentage is added to storehouse stock to absorb charges for deliveries from stock, storekeepers' salaries, rent of building, taxes on stock, and such other items as go to form a sort of "overhead charge" against the storehouse stock. This item is also recorded on the reverse side of the sheet in order to make possible its segregation when a physical inventory of the storehouse is taken periodically and to know definitely how much has been charged out on ac-

count of percentage and how much account of actual stock. When this arrangement is used a regular "Percentage Account" is opened in the storehouse books.

Relationship of Storehouse and Purchasing Department

There are many good ways in which a storehouse stock may be handled and a great many more poor ways for doing this. The proper operation of a storehouse account requires much study by the storekeeper and by those in charge of the project. All conditions under which the work on project is handled must receive consideration: how far from transportation; relationship of storekeeper with the purchasing department; volume of business handled, all have a very direct bearing on this department. Sometimes the storehouse and purchasing are handled by the same person. Whatever the manner of operation, the storehouse should have a very close relationship with the purchasing department and the purchasing agent should know intimately at all times just what is in stock to enable him to make intelligent purchases. One man should be held absolutely responsible for the storehouse stock—assume responsibility for everything which goes into the storehouse and what is removed. If this is done, then definite personal responsibility may be fixed for improper handling of the stock and for shortages should they develop. This fixed responsibility is important as much for the giving of credit where credit is due, as for placing responsibility when something has been "bungled."

Responsibility Should Always Be Definitely Fixed

Where one man is held definitely for the operation of the storehouse and handles the stock both incoming and out going, much of the grief frequently found in this particular branch of the work is eliminated. Men of judgment and diplomacy must be secured for this work, and it is difficult to state which of the above accomplishments they may be called upon to use most frequently. The storehouse on a project or in any work should be entirely separated from all other work and handled as a complete and separate unit. Each man in authority should be definitely and adequately impressed with the fact that while the store stock may belong to the same outfit which pays his salary he has no more license to take one article from it without going through the formality of issuing a requisition, or such other procedure as may be decided upon to protect the storekeeper, than he has of going to the "little corner grocery" and taking goods off the shelf. The store stock is the same as money, it frequently represents great sums of money in merchandise, and its stock should be guarded as closely as other funds of the company.

The storekeeper has a difficult position at best and if he is considered by his superiors capable of handling the position, he is deserving of the assistance of, and patience from, every man on the work. The storekeeper, however, should also do his part by making every effort to deliver goods promptly and display a considerable amount of self control when things are inclined to go wrong. He must continually study his stock and the needs

of the project, talk frequently with the construction men, draw them out as to future plans and requirements. Their minds may not always be on ordering ahead, that is the storekeepers work and he should take every legitimate means to learn in advance the needs of the work and place his requisitions or orders accordingly. Watch the markets and keep stocked up ahead of prospective advancement in prices. If roads are poor in the winter months or at certain seasons in the summer, keep this in mind and order for delivery when road conditions are at their best. This makes good interest on the money invested in the stock. It is a commercial enterprise and should be watched as such. The storekeeper must display some of the qualities of the live aggressive and long headed business man if he is to make a success of his work.

Stock Card Has Numerous Functions

This stock card shown on Plate 14 is also used as a combination price card for purchasing department, a perpetual inventory card, a stockman's price card and as an index to firms with whom business is transacted.

Plant Requisition Book

A very handy little general form is what is known as a "Plant Requisition Book." This is used for requisition purposes, but also for numerous other purposes, including that of general memorandum book and confirmation of verbal orders. The form should be small, made up in book form with a perforated white sheet which is to be torn out when an order is written and a sheet of another color not perforated which carries a

Herewith is copy of form which has been used for the purpose above described. The size of this form is $3\frac{1}{4}$ inches wide by $5\frac{3}{4}$ inches in length:

DATE _____ 1919

Storekeeper: Please deliver to me by _____

the following articles:

For what use: _____

Signed_____

Instruction for its use, printed on inside of cover, follow :

Instructions for Use of Plant Requisition Book

“As early a date as possible after it is known an article is to be required—a requisition should be filed with storekeeper and as much time given for filling as can be allowed. This does not mean that the Purchasing Department may not fill the order sooner than the date mentioned, but it gives that department an opportunity to secure prices from several firms, or to group smaller purchases and secure better prices. Emergency orders are usually expensive and it is desired to have as few of them as possible.

In cases where goods are required immediately the storekeeper will phone the order to Purchasing Department and prompt attention will be given.

Care should be taken to give sufficient information on requisition form to assist to a reasonable extent in preventing erroneous purchases. All plant requisitions will be approved by the General Plant Superintendent. Purchases will be made on emergency orders on approval of local plant superintendents, and afterwards presented to General Plant Superintendent for his information. All other orders will be placed before General Superintendents of plants before purchase is made.

The work for which articles are required should be mentioned on requisition in such manner as to enable Cost Department to make proper charge.

In all cases state at top of requisition when delivery of goods are desired.”

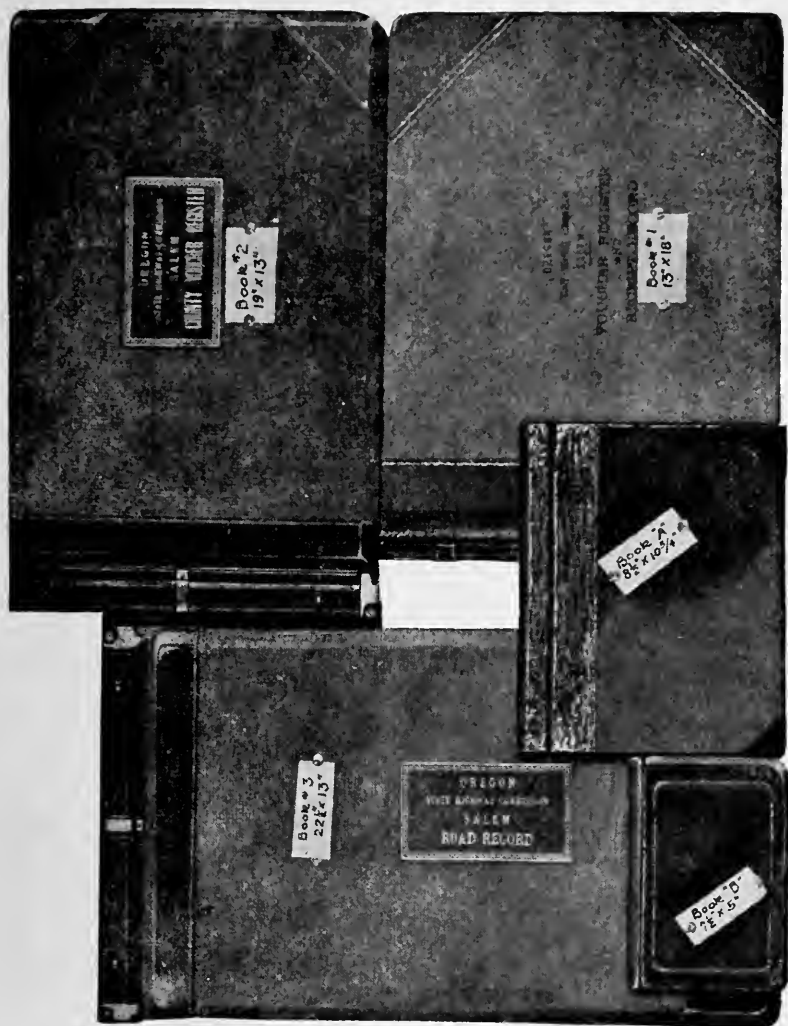


Plate 12.—Graphic example of condensed office records made possible by use of numerical method of accounting. Three larger books, 1, 2 and 3, were replaced by two smaller inexpensive ones, “A” and “B,” in lower left hand corner. The size of the small books is $8\frac{1}{2} \times 10\frac{3}{4}$ inches and $7\frac{1}{2} \times 5$ inches and all forms shown on accompanying pages except card forms, are of a size to fit one or the other of the above two binders.

But Few Forms Should Be Used

The forms shown on the foregoing pages are considered some of the more important used in construction accounting. The number of forms and their kind, for use on construction work, depends largely on the nature of the work and the manner of handling it. Usually a man is to be found on such work who develops ability in preparing practicable forms and the job of censoring all forms should be in the hands of a man of this type and he made responsible for the kind of forms to be compiled on the work. Frequently this nature of work has a tendency to run too largely to form making, and without mature study as to the function the form will actually fulfill when put into operation. The result is piles of obsolete forms. The fewer forms that work can be handled with usually mean better results. The few should run high as to quality, however.

Plate No. 12. Condensing of Records

This plate is a graphic example of condensed office records by use of the numerical system of accounting. It shows the books formerly used by the Oregon State Highway Department (Nos. 1, 2 and 3) and those later in use (A and B). Note the dimensions of the former and compare with the dimensions of the latter. Aside from all other advantages of the condensed record, it is believed that we now have a much more useful set of books, both as to cost data and general accounting requirements, than was possible with the former system of three large books. The two small books are kept in a small pigeonhole in the bookkeeper's desk, convenient for quick reference, while with

the larger set it was necessary to keep a special rack for them and was impracticable to work on more than one at a time on account of the space required when open. Engineering data is almost universally gathered in small, compact pocket size books. There is no good reason why accounting and costkeeping records should not be condensed in the same convenient form. The smaller book (B) contains all general ledger accounts, cost ledger accounts and summary of financial statements. Also all allotments from general fund. The larger book (A) contains the voucher register for both county and state vouchers, which are divided into sections and a check register covering county and state expenditures, also divided into proper sections. The advantage of working on small forms is readily apparent to one who has practiced accounting.

Small Binder Fills a Need

The author has for years advocated and used the small general office forms. The cost ledger and general ledger forms are each $4\frac{1}{4} \times 7\frac{1}{4}$ inches (pocket size). These forms are found as suitable, in conjunction with the numerical system of accounting, for work aggregating millions of dollars, as they were originally found to be on smaller work. The small binder has come to stay, it is the practical book to use, not only on construction but also on commercial accounting work and has many advantages with none of the disadvantages of the old large binder system, which is used more because of a "habit" than from necessity, or good sound business reasons. The author is now installing this system complete, small binders and all, in

one of the largest and most complete fruit products manufacturing plants in the west—a one and one half million dollar corporation—with several plants in the states of Oregon and Washington and which maintains its own national selling organization.

Reduction in Size—Increase in Quality

The fact that records are reduced to pocket size does not mean that any essential data has been eliminated. On the contrary the costs are secured in much more detail and volume in this condensed form than had ever been the case with the old method used by the Oregon State Highway Department, wherein three large binders, which combined would entirely cover the top of a large sized table were used. The fact that the first record taken from the field is in such form that all detail is forever available has resulted in considerable reduction in the expense of gathering costs, over other methods which secure the original data in the field in one manner and assemble it in an entirely different manner when it arrives at the general office, or at the office of the district engineer. There should be the closest relationship between the field and general office in the gathering of costs and the costkeeper is or frequently can be the connecting link, if he is the right kind of a man and imbued with a reasonable amount of resourcefulness and diplomacy.

GENERAL INFORMATION REGARDING ACCOUNT NUMBER BOOK AND FORMS ILLUSTRATED

Also the use of the system in general

Few Numbers Are Used at One Time on Each Project

The fact that the account number book contains twenty-two features and 885 items (counting the blank spaces as items) should not cause discouragement or a decision to go no farther. As a matter of fact, a timekeeper on the ordinary job will not be required to use more than thirty to forty new numbers in any one month, and during the progress of the work has sufficient time to become gradually familiar with all the items of the features with which he is concerned. The unused numbers in the book need cause him no worry. For instance, a new camp is constructed. The first week the timekeeper finds he has use for a few of the numbers under "Camp Construction," "Messhouse Operation," "Corral" and "Blacksmith Shop." Then follows the "Clearing of Right of Way" and "Construction Sub-Grade" numbers. About this time he may find that he has occasion to use a few of the numbers from each of the features mentioned, as there may be a few repairs and additions to the camp buildings, the burning of brush along the right of way and items of such character, but he has become familiar with the principle, lost his fear of the large number of items and discovered how simple,

on actual work, the method proves; memorizes a few of the most frequently used numbers, and his troubles are over. If all other records of the work were lost the cost ledger in itself would give a fairly good record of the monthly progress.

No System Is Entirely "Fool Proof"

While the method of accounting as outlined in the foregoing pages has been equal to all the emergencies in accounting that arose on the construction of numerous projects on the Pacific Coast, the two largest of which was the construction of the Tumalo Irrigation Project in Central Oregon and construction for the past number of years by the Oregon State Highway Department, an accounting system, regardless of its adaptability to work intended to cover, is not self-operative and should not be expected to produce results without the exercising of that experience, judgment and care which is required to successfully operate any other line of business. Success in field accounting and accurate workable cost data will be secured in the same measure as the accountant is found to have energy, judgment and experience in such work.

"Horse Sense" vs. College Training

Occasionally on engineering work men apparently well equipped technically in engineering, but who do not develop sufficient judgment and ability to handle engineering, are considered capable of handling costkeeping and field accounting. Almost anyone who is able to write can mark X's in a timebook and O. K. on invoices. If costs are desired on which a contractor dare risk his money

and an engineer his reputation, a man who is a failure in other lines, is usually not a fit person to handle costkeeping or field accounting, regardless of the university or college from which he may have graduated.

Accounting a Profession

Accounting, construction or mercantile, is a profession in itself, and like other professions, has many degrees of efficiency and inefficiency. To become proficient an accountant requires long and careful training; must be able to exercise good judgment and acquire an intimate knowledge of a vast amount of detail.

Purchasing

To successfully handle purchasing on the average construction project he should have a working knowledge of prices and qualities of a more general line of merchandise than that handled by general mercantile companies. He handles all the goods they do; must know grocery values as intimately as competing salesmen know each other's brands, and in addition frequently purchases a full line of general construction equipment, ranging from steam shovels and industrial railroad outfits to the plasterer's trowel. Various manufacturing enterprises are in progress on the average construction project, especially where a machine shop is operated, on which he must have the same intimate knowledge of costs and values that the modern manufacturer requires of his employes.

Of course, all accountants on construction work are not possessed of all the above qualifications, but in a large degree the result of their work will

be successful to that extent by which they measure up to the qualifications outlined.

The numerical system of accounting is quickly installed and its principles easily understood—more so than the average system on either construction or mercantile work—but do not interpret this statement as meaning that its efficiency can not be partly or wholly impaired by inefficient handling.

SUGGESTIONS ON ORGANIZATION

“Education is not the result of a course of study—it is the result of a course of experience.”

—ELBERT HUBBARD, in *Roycroft Reminders*.

Organization building is a combination course of “experience” and study, and it is not believed there is any standard form to follow. However, there are a number of principles having a bearing on this important function which may be observed with profit.

Organization is the banding together of various units into a harmonious working body. These units may be individuals or groups of individuals. If made up of groups and each group is working unitedly; then the main organization is undoubtedly progressing satisfactorily. If results with the main body are not satisfactory then search should be made for the trouble, unit by unit, until detected. This process eliminates the necessity of upsetting the entire body, when the trouble is located in one small unit. When all units are “marching abreast” and on “quick time” a real organization capable of doing things, is “on parade.”

Higher executives may do much to assist in the advancing of efficiency by a little care and attention to the first principles of organization.

The seemingly unimportant acts of an executive in the presence of a force of employes will some-



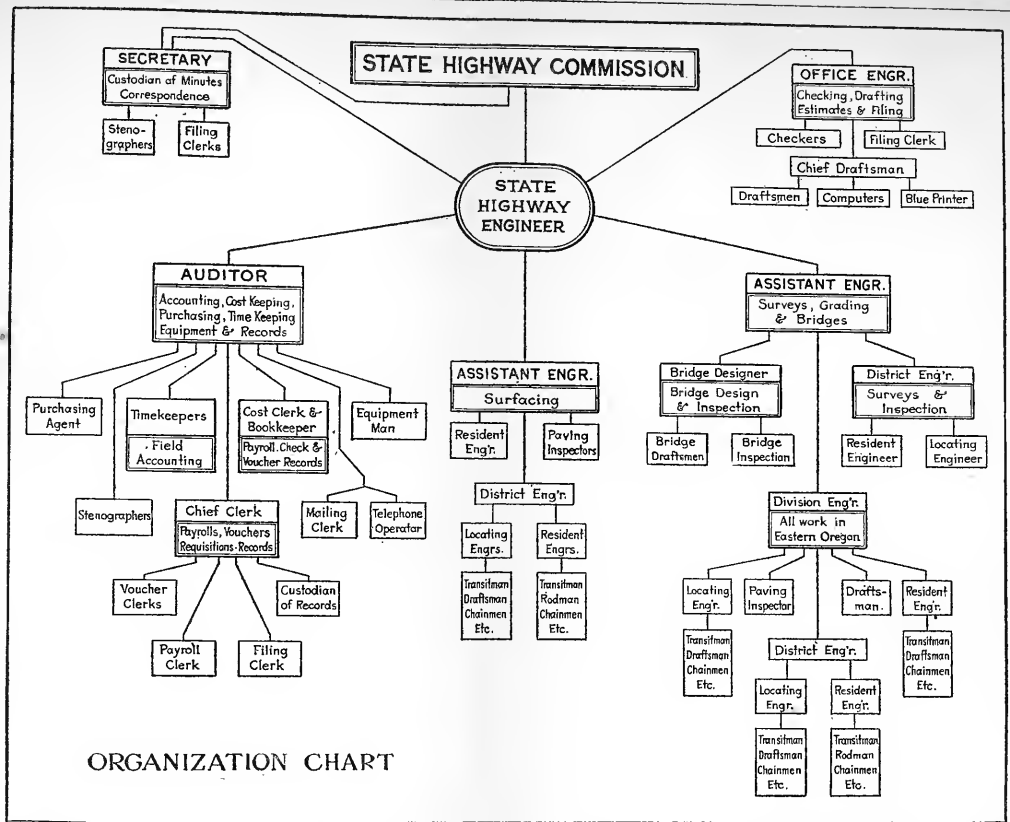


Plate No. 15.—Organization is determined by nature of work, location, and other conditions, rather than by cut and dried rules. This plate is shown as a "suggestion" only.

times do more to offset the securing of satisfactory service by the men in direct charge of employes than all the hard work they do to perfect their working forces. An executive, perhaps, is on such friendly terms with some of the subordinates as to encourage belief that their immediate chief has but little to say regarding their demeanor when it comes right down to brass tacks and soon this attitude permeates the whole organization. No one appears to exactly diagnose the trouble, but results are not being obtained by the sub chiefs. Elaboration on this subject is not necessary. It is matters of this kind which prove very annoying to the man who sits up nights drawing organization charts and planning his work in an endeavor to get more efficiency into his work for the benefit of the firm by whom he is employed.

Intelligent organization demands that the individual who is responsible for the production of a certain thing, be given all the support within the power of the employer to this end. If the production is something he is to turn out with his own hands, then he will require tools and materials. If it is to be done by several units with him responsible, then he certainly must have more than superficial authority to secure best results. If he is considered capable of handling men, then he certainly can and should expect his superiors to respect that authority. If they desire his work to be handled in a certain manner, or any member of his force to change methods of operation, the one in whom reposes the responsibility for the completed work is the one to whom, and through

whom, orders should be given. This principle applies to every kind of work of whatsoever nature and when the rule is not followed (presuming always that the sub chief is competent, and if he is not then there is no excuse for his remaining in authority) the efficiency of the performance is hampered to whatever extent interference is allowed.

Plate No. 15. Organization Chart

A graphic chart, or "picture" outlining clearly and distinctly the duties of all employes, the relationship of departments, and the responsibilities of the chiefs of sections, is usually more quickly grasped and understood by employes than an attempt to convey the same information by letter.

The average employe who is able, wide awake and ambitious, realizes that he must, in a large organization, have some protection in order to secure credit for work which he is honestly endeavoring to do in a little better manner than his associates. One way to protect individual employes, where the work is of such nature as to permit it, is to devise an organization chart, or instructions, which will outline each employe's duties distinctly and at the same time indicate to the entire organization the duties of each member. This gives each one the advantage of knowing where to begin and where to end and his full responsibility. Of course an organization that is worth while is made up of employes who will do more than their particular piece of work, when they have the time, and someone else should have assistance, but usually each one who is com-

petent wishes to have certain sections of work and be enabled to make as good showing as possible. This segregation in itself will do much toward encouraging better results, where such results are rewarded in a reasonable manner.

Each organization must be built to fit that certain work which is before it, and even though the work may be much the same, an organization for results is dependent entirely on the type of employe which is available; the location of the work, facilities for doing work, and many other conditions of this nature.

The organization chart shown on Plate 15 was made up to fit certain conditions and met them as they were. The arrangement speaks for itself. Where a competent purchasing agent is available, in addition to his purchasing he could be made responsible for the equipment and records and operation of general and field stores. The cost man in addition to cost accounting, could assume responsibility for the timekeeping forces, thus relieving the Auditor of considerable detail work. Other changes might also be made to advantage if the personnel of the force is made up of employes capable of handling more responsibility and who are sufficiently competent to handle men. One of the foremost principles in getting the maximum results from men is to treat them properly, regardless as to their own attitude; and endeavor always to improve their methods. Not only show them short cuts in manners of handling work, but go through the work with them and demonstrate better ways which they may not have knowledge of. Be

patient, thorough, and persistent with them. This coupled with an honest "from the heart" fairness will hold and improve most any kind of an organization, if the leader has average ability along other lines.

The paragraphs which follow are more or less at random and have no consecutive relationship.

Practicability Eliminates Favoritism

A real executive's education has taught him to deal with the practical, rather than the theoretical side of problems. Results are the only yard sticks by which he measures his organization. Favoritism has no place in his make up. Justice only is the ruling factor.

The Advantage of Being "Just Natural"

It has been observed that the best employes usually are those which appear natural and work naturally. There is a tendency for young men and sometimes older ones who ought to have learned better, to attempt to mimic someone else; who apparently are ashamed of their own station in life and want to give an impression that they are what they are not. If a person is honest, normally intelligent, making a systematic effort to improve himself, and doing the best he can with what he has, he should have nothing of which to be ashamed. When a person is found attempting to appear what he is not (and such people seldom fool anyone except themselves) it is to be assumed that he lacks some of the above qualities and is ashamed of his real self. When a man on a moderate salary attempts to "ape" the well to do and spends his money extravagantly, he is to be

watched very carefully by his employer. This is one of the first steps toward actual dishonesty. Besides being ridiculous in the eyes of intelligent people, it does not pay in dollars and cents to attempt deception along these lines.

The Successful Chief a Question Mark

Men in administrative work should carry in their minds a question mark continually. Intelligently question practically everything; take nothing for granted until amply proven to be the fact desired. Look for errors and for opportunities for improvement. This view point, reasonably and pleasantly carried out, is what makes a strong working organization, one whose individuals will soon get the habit of questioning themselves in an endeavor to forestall any shortcomings which may be found in their work when they appear before the chief with a completed job. Honest straightforward questioning will strengthen an organization wonderfully, while with an attitude of taking everything for granted, and no questioning, a good band of employees will soon become listless and lacking in necessary interest for good work.

The Executive Must Have Full Confidence of His Associates

An executive cannot always tell in detail just why he makes certain requests. He should have the respect of his organization and they must act largely on faith. Loyalty in an organization is frequently of more real value than brains minus loyalty. A good organization will endeavor in every manner possible to carry out intelligently the direction of its leader, whether or not it may

agree in every particular as to the wisdom of certain actions. Of course there arises situations in which it may be perfectly proper to question the chief regarding some manner of procedure. A competent organization leader will invariably listen to his subordinates if they approach him properly. When he then tells them he still believes his original order should be complied with, it is time for the organization to put its shoulder to the wheel and push as though the thing were being done as they would have it.

Leaders Develop Their Own Methods of Procedure

Nearly every leader has a manner of his own in handling his subordinates. Successful operation comes largely by the spirit shown in both organization and leader, rather than in certain prescribed and set rules of procedure, and this spirit is one of willingness "to take and give" which requires a large measure of loyalty to the business itself, rather than simply to any one person. Such loyalty inspires the overlooking of many things that would not go unnoticed without it. Loyalty, pure and wholesome is probably more appreciated by employer and leader, than any other one qualification an employe might have. When loyalty and ability are combined in one man, building for that person is only a matter of time and patience.

A Good Mixture

Energy and patience is another very good combination for a man to possess. These two qualities are not always found in the same person. The

last portion of the "Psalm of Life" expresses a very good sentiment along this line.

"Let us then be up and doing
With a heart for any fate;
Still achieving, still pursuing,
Learn to labor and TO WAIT."

Most of us learn to labor but with the "doers" it is sometimes difficult to "energetically wait."

An Organization Improves As Initiative Develops

Great care should be exercised by the head of an organization to encourage initiative. He should know intimately the dispositions of his force and not let himself become prejudiced on account of personalities which are not agreeable. Some of the very best and most capable employes, and the most reliable as well, if handled properly, are those with dispositions which we might hope were different, to say the least. The leader of an organization should be a man who has naturally a yearning to "build up" and his organization must be studied from that standpoint. Fit the men where they are best suited to work. If he has men who are very capable but hard to work with, spend a little time trying to help them overcome their shortcomings. Talk to them plainly and straight but privately. Most men will stand most any kind of advice from an employer, if they are convinced that the employer has their interest at heart. There is no harm in telling an employe honestly his faults, if done in the proper spirit. Help him over the rough places—show him where it costs him real money to allow his disposition to rule instead of he ruling it. Such a man salvaged

from himself will usually make a most excellent and reliable employee, and is worth all the trouble necessary to straighten him out.

The Man With a Wish-bone Where a Backbone Is Required

Some men, when work becomes trying are always threatening to "quit." Such men should be encouraged to keep their word the first time they make such a statement as they are either bluffing or weaklings and neither of those qualities make valuable employees. All have troubles, but it is only the weak who lay down under them. Leaders are developed through difficulties and it is the ability to handle trying situations that makes life worth while and strengthens confidence in ourselves and those who stand with us when the problems look hopeless. The "other fellow's" position is usually seen in a more favorable light than our own. This fact recalls to mind a verse picked up from "Can-nery Notes" which runs about like this:

"Happy the man who loves his work,
And loves his work alone;
For many a man loves another man's job
When he ought to be loving his own."

Snap Judgment a Poor Foundation

When changes in the method of handling certain work are contemplated, instead of taking snap judgment and authorizing the changes as requested by an employee who is perhaps interested only in one side, a very good and conservative action by the chief is to call together all the employees who will be affected by the change, stating to them just what is contemplated.

Secure their opinions as to the value of the change. If there are objections, weigh their merits carefully. The head of the organization is then prepared to go over the matter methodically and intelligently, make his decision and have it stick. Snap judgment decisions which are later countermanded cause confusion and loss of respect necessary from subordinates for their chief if maximum results are secured.

Deserve Success

The writer, when in Pensacola, Florida, noticed an inscription on a Confederate monument for Stephen R. Mallory, Secretary of the Confederate Navy, Jefferson Davis, Confederate President, and others, which ran as follows:

“’Tis not in mortals to command success, but we’ll do more, we’ll deserve it.”

That sentiment is good and one we might all profitably dwell on and endeavor to practice.

A Moral Obligation

When a man agrees with himself that he will do this or that good and necessary thing “after while” he issues a promissory note to himself with his future as collateral. If he redeems that promise his future is redeemed; if not, it does not take long for his chief creditor “Opportunity” to show him a bankrupt in the Courts of Success.

Putting Pep Into Dull Work

When work is of a monotonous nature, the employe to make the best time possible should devise means of making the work interesting. For instance on payroll work where 1500 men were

paid each month, the payroll clerk had an exceedingly hard time to keep his mind on the work in such manner as to secure satisfactory results. He computed every item from the timebook while entering it on the payroll with a typewriter. The clock seemed to move very slowly. Finally he hit upon the scheme of "racing" with the clock. He made a wager with "himself" that he could enter a certain number of items per hour. Went at his job with all his might, lost the race with the clock and tried it again. In looking at the hands of the clock from that angle he found they moved very rapidly and he was enabled to put enthusiasm into his work and produce a greatly increased volume. It might be added that this payroll clerk very shortly became chief clerk of a large organization. Initiative and action always have their reward.

Be a Producer

Each living mortal should be a producer of something, and strive to make that "something" of greater and greater value as time goes on. The apparent idea held by some awfully misled individuals that to be of service is degrading should be the cause of pity by those who produce. Every man can produce if he will. To consider one kind of labor or service more honorable than another is a mistaken idea. It is true that perhaps one man's labor, on account of his greater ability along certain lines is of more commercial value than another's, and should have more recognition, but the matter of honor in service comes largely from the spirit in which that service is performed. The

man with the pick and shovel doing with all his might what has fallen to his lot to do, and with the desire of making his efforts count for something tangible, should be considered in a more favorable light than the more fortunate and perhaps better educated man who does his work grudgingly, and as little as he can find it possible to "get by with." The spirit of service performed counts mightily in all walks of life. Honest service is never degrading. The attempt to get through the world without it many many times indicates an exceedingly low type of civilization and is something of which any healthy, normal and able bodied mortal has good reason to be ashamed.

Why Should There Be Friction Between Office and Field?

There very often, and for little or no apparent reason, develops friction between general office and field, or between division office and general office on construction work. The reason perhaps is usually traced more or less directly to the jealousy of someone, or at least the trouble was started that way, became a fixed fact, and continued long after the real cause was forgotten. But friction in any organization, regardless as to why or where, is almost always, for all concerned, an expensive condition. It wears the nerve energy of the principals which perhaps is the most expensive factor, and in addition to that it costs someone real dollars and cents, when a grudge or ill feeling is allowed to "ferment." One way to minimize this to a considerable extent, is to have occasional meetings of the field and office men under conditions which make it practically

impossible for them to "talk shop." Give them an opportunity to become acquainted. Perhaps the factions who are considered enemies on the work will find they have much in common in social life, or on a fishing trip, camping, or some other kind of recreation. It is always easier to quarrel by "letter" than with acquaintances face to face. If we know "our man" personally, perhaps some of those insinuating letters will not be written. Why a mean or domineering letter anyway? Are we at our work to satisfy a grudge or to secure results? Which are the most important, accomplishments or satisfaction? Each man should ask himself these questions when by himself "in the dark," answer them honestly and then act accordingly. "Getting even" has put many otherwise good men out of commission and what was it worth? Talking to one's self is not an altogether profitless pastime, if he talks on the proper subject, and answer himself straight.

Faith and Charity—Close Friends Always

Men should have faith in each other; in themselves; in the firm for whom they work; in their subordinates; and in their neighbors. Occasionally a man with this attitude is "stung" but no more often is he mistaken than the man with the perpetual grouch who is suspicious of everyone and everything—and the condition of mind of these two men can hardly be compared. As a rule men are honest, the exception is comparatively small. Men who are overly suspicious are usually tearing down. Take your choice with all that goes with either selection.

The Man Who Works Nights and Grouches Daytimes

Sometimes overwork will cause a man to become disgruntled and he is inclined to feel that he is not getting a fair deal. Such a condition of mind will eventually affect this man's efficiency. He should be forced to take a vacation and stay away from the work. Habitually working nights, regardless as to the cause, will break down a man's efficiency and employers cannot afford to allow their employes to make this a regular rule. When a man is kept "sweet" he is usually giving his employer much better service than the man who works nights and grouches day times.

A Few Suggestions to Employes

Following are a few paragraphs taken from different sections of a "Manual of Instructions to Employes." These paragraphs have been considered of sufficient value to bear repeating:

Two Important Factors

While in the employ of this Commission, you are expected to accomplish two things: First, well executed work. Second, the co-operation and support of the people of the community in which the work is situated. One is as important as the other. You must bear in mind that your actions will govern the opinion the local people will form, not only of the piece of work in hand, but of the whole conduct of the department. You should, therefore, see to it that this opinion is favorable in so far as strict attention to your work and a businesslike courteous manner on your part can form such an impression.

Do Not Antagonize

Highway work is understood by the general public in a limited way, and the necessity and methods of surveys are regarded by many people as useless and a needless expense. As this is public work everyone is more or less interested, whether in favor of the work and methods or not, and is entitled to courtesy and general information. *One man*

needlessly antagonized may hinder road work in a district for years.

A Good Manual a Continual Friend

This manual, together with the personal instructions you are receiving, and department letters which will be issued from time to time, are intended to aid you to execute your work in a proper manner, and if followed intelligently should assist in the accomplishment of the first part of your mission.

Do Not Mix in Local Disputes

But rules to govern your conduct so as to establish a favorable impression are not so easily laid down. In addition to your duties you will be required to exercise plain common sense in your dealings with the people with whom you come in contact. Good sense will indicate the folly of mixing or becoming a party to local political disputes, or differences of any character whatever. Always give courteous attention and consideration to all inquiries for information, but should questions be asked on any point about which you are in doubt, or your instructions forbid you giving such information, explain the situation, stating that you will be glad to refer the questions to the general office if so desired. If the plan of the work or the methods required by the specifications are at all in question, you may explain that these are a part of your instructions which you do not have authority to change.

Watch the Small Details Methodically

Upon being assigned to take charge of a piece of work, the employe immediately upon reaching his permanent headquarters for that work, should report to the general office his post office, telephone or telegraph address, also location of nearest express and freight office. He should leave his name and address at the telephone, telegraph, post office, freight and express offices, and make sure that they understand where he can be reached. He should also leave a list of the names of the employes under him at the local post office that they may receive their mail promptly. The general office should at all times be able to locate employes promptly by letter or by wire.

General Office Must Face the Public With Definite Facts

It is absolutely necessary for the general office to be fully in touch with all business transactions and other matters of an executive nature on the work under its direction. To accomplish this it is expected that field employes will

take up everything of importance with the general office, before final action is taken, except in such cases as constitute real emergency and require immediate action, when reports in full covering them should follow.

Well Kept Diary Is Valuable

Diaries should be kept by each employe who is in charge of and assigned to definite work, stating briefly the daily progress in a general way and recording all events of a special nature. These should be accessible for inspection from time to time, and remain the property of the State Highway Department; and shall be turned in to Auditing Department for filing promptly at close of season or severance of employe's connection with the department.

Little "Red Tape" Necessary

We are endeavoring to handle the accounts with as little "red tape" as is possible and believe the State Highway Department requires no more "red tape" and probably considerably less, than the average large corporation or business establishment doing the same amount of business. Good business policy, however, demands that accounts be rendered in such a manner that intelligent check can be made, and it is with this end in view that these regulations are promulgated and sent out to you for your guidance. An employe's value to the department is based largely on his understanding of the requirements of the department, and his willingness to adapt himself to those requirements as well as his ability to handle the work which is assigned to him.

The Able Chief Does Not "Pass the Buck"

A man in authority and in charge of a force of men should always issue orders for which he has authority as coming from himself and not belittle his position or his prestige with his men by appearing to "pass the buck" and stand behind someone else when unpleasant orders must be given by saying "He says I must say to you, so and so." This "He says" statement takes Mr. Chief's prestige away from him and makes him simply a messenger with orders from a superior. A crew usually look up to a man who is by nature

and experience a leader and not one who by apparent "luck" has become a "misfit" in such a position, and who has a case of "cold feet" every time he is asked to do the things for which he was employed. If the order is necessary and proper and must be done, stand out and be responsible for the issuing of it. That is the way real men grow stronger. "Passing the buck" makes weak men even weaker.

Neat Pages and Figures vs. Intelligent Records

One of the weaknesses of the average book-keeper and some accountants is the inclination to put more importance on neat pages, than on the practical value of records. Too much time is spent trying to devise means of correcting an error when a straight neat line across the account would be the practical, most direct and intelligent manner of handling such a problem. The value of a neat record is not to be depreciated, but the original and practical function of the record is of the greatest importance, and if either is to be sacrificed, by all means let us have a little less of neatness and more of practicability. Time is always an important element in every branch of construction accounting and the most direct manner of doing things, is usually the best.

THE CONSTRUCTION COSTKEEPER

When we think of costkeeping it looks simple—and seems as though it should be simple. One is liable to feel his fitness as an authority on this subject to a greater extent after the first month's work than after he has spent a dozen years at it. It is the expense items that do not appear on the surface that are very important in this work—the usual expenditures everyone is looking for and they are easily assembled, but the difference between these very apparent costs, and the ones not so easily located, is the cause of many a bankrupt.

Cost Work Is Important

A costkeeper should erect a standard—build it early in the game and stand there regardless of what happens. He can rest assured that annoying and irritating problems will present themselves to him frequently enough to keep his life from being dull or monotonous.

The costkeeper must remember the importance of his position—this does not mean that he should look upon it, and himself as costkeeper, in such a manner as to make it necessary to secure a larger sized hat—but he should realize from the first when he is placed in a position as costkeeper, or a subordinate in the costkeeping department, his responsibility to that firm, that on his integrity, reliability and accuracy and also his resourcefulness and foresight depends to a very large extent the development of a business.

He must learn to be right—not almost correct, but correct, absolutely correct and to be sure of his ground.

“Cannot Edward, Did You Say,
Chase That Lazy Thought Away”

The man who makes good on this class of work must be many sided, a close observer of everything which passes, a diplomat, and all the time a gentleman. The statements which follow may perhaps be prefaced with the few verses which have often been read, but which may be repeated many more times with profit.

IT CAN BE DONE

Somebody said that it couldn't be done,
But he, with a chuckle, replied
That, “Maybe it couldn't,” but he would be one
Who wouldn't say so till he tried.
So he buckled right in, with the trace of a grin
On his face. If he worried he hid it.
He started to sing as he tackled the thing
That couldn't be done—and he did it.

Somebody scoffed: “Oh, you'll never do that;
At least no one ever has done it.”
But he took off his coat and he took off his hat,
And the first thing we knew he'd begun it.
With the lift of his chin, and a bit of a grin,
Without any doubt or quiddit;
He started to sing as he tackled the thing
That couldn't be done—and he did it.

There are thousands to tell you it cannot be done,
There are thousands to prophecy failure;
There are thousands to point out to you, one by one,
The dangers that wait to assail you;
But just buckle in with a bit of a grin,
Then take off your coat and go to it.
Just start in to sing as you tackle the thing
That “cannot be done”—and you'll do it.

Cost accounting is a science, not an accident and science puts things whence they ought to be and not where they happen to be.

Practical Knowledge of Field Work a Decided Asset

The costkeeper is essentially a "Field Man." Costkeeping is a practical study with but the minimum of theory mixed in. The outside man is more likely to get at the facts and conditions which must be brought out to produce true and actual costs, than is the strictly office man. The combination office and field man—a man who has worked at manual labor of some kind in his early life or boyhood and developed practicability and later becomes familiar with office methods and practices (but not to the extent of desiring to wind everything with "red tape") makes a very good cost man. A conservative mind is one of the strong essentials for a cost man.

Cost Work Requires Much Detail

Cost accounting is hard detail work and usually means long hours. Unless a man naturally likes it, he has but little hope of making a success of it. To the man who gets into it right, from his heart up, it is a most fascinating occupation.

New Leaders Are Continually Being Developed

A man should not judge or gauge his work by his pay—do an honest day's work and the pay will follow eventually—if not from your present employer, from some other observing employer. Leaders are developed out of nearly every organization, and they are usually sufficiently observing and long headed to select those of the organizations which they leave to fill the important places on their own organization. For work properly performed the reward is eventually certain.

Costman Should Know Neither "Friend or Enemies"

The costkeeper should be neutral—his likes and dislikes absolutely must be set aside if he is to be successful in that line of work. He is dealing with facts entirely and not with "notions." If John Smith's costs show him to be a capable man then John Smith should have the full credit and because John Smith does not think the costkeeper amounts to very much and the fact that the costkeeper does not like John Smith's wife or daughter has no bearing on John Smith's cost record. It may seem peculiar to see such a statement printed for the reason that it seems ridiculous to intimate that costs might be judged by anything other than facts—yet it is astonishing how few men seem capable of laying aside entirely their personal grievances in such matters—and it is equally true that many of the failures to secure satisfactory results on work may be traced to the fact that personalities could not be forgotten when cost figures were compiled. A costkeeper, if he is at all able, usually has considerable prestige and it is occasionally difficult to keep from improperly using it. However, any man who uses prestige unfairly has but to look ahead a short distance and he will see his path pointing downward and continuing downward until he can measure up to a real man's standard.

The Good Guesser Is Out of Place Here

There is no room in cost work for guessing. Facts are facts and should be compiled as such. Of course a costkeeper's friends change frequently. When he reports good costs on one set of jobs, there his friends are found, while later when the

costs are not so good, or perhaps bad, then they are arrayed against him. He can do much to overcome some of the opposition that occasionally attaches itself to men in his line of work, by taking a few minutes occasionally and going over certain foremen's costs with the foremen themselves. Give them an idea of the detail that is carried and the care with which the units are checked. Show them the reason for some of their unusual costs so that they may better know the amount of labor and time that is put upon their work. They should also be shown the reason for certain "red tape" which men on construction projects usually call any kind of requirement from the general office.

The one predominant thought in practical accounting is to get intelligent and prompt results, not figures only. A cost statement should be attractive and as readable by men who are in touch with the work as a newspaper.

Accompanying Narrative Important

As supporting narrative for charges against the various account numbers, and for historical purposes, the costkeeper should have a carefully kept diary covering all important events during construction.

Another very necessary permanent record in connection with the keeping of costs on construction work, is a comprehensive narrative statement covering such items as wages paid the various classes of labor, cost of materials and supplies on the job; rental and purchase prices of equipment; the kinds of equipment used, with a little elaboration on the good or weak points and the meth-

ods employed to improve the service of the equipment; weather conditions; the condition of the labor market; distance from the project to the nearest shipping point, and any other data which has a direct bearing on the work performed.

Provide Intelligent Data for Future Use

The value of the cost record for use in subsequent years as a basis for other estimates will depend largely on the fullness and accuracy of this narrative statement. Cost records of two years ago are of very little value today as a basis for estimates without such a narrative, owing to the great fluctuation in prices of material, supplies, and labor.

Cost Man Should Work Directly Under Chief of Project

A finished mechanic, to accomplish the best that is in him, must have good tools. These he does not abuse, his reputation depends largely upon their being kept in good condition.

A competent accountant, or cost man on construction work to accomplish the best there is in him must also be supplied with proper equipment. His equipment consists largely of sufficient direct authority to enable him to secure the proper data on which to base his cost record and build up uniform and complete records. He should report direct to someone high in authority and have the support of that person so long as he is responsible. If he is a competent man, and possessed of sufficient judgment to make a good cost accountant, he will no more abuse the authority given him, than the finished mechanic will his

tools. The soundness of this logic is unquestioned so far as the mechanic is concerned. Does not the illustration apply with equal force to the accountant?

County Officers Should Be Encouraged to Keep Costs

It seems to be a general impression that the greatest handicap by some counties in securing authentic cost records is due to the fact that much work is handled by supervisors who are not sufficiently intelligent or interested in their work to give serious thought to practical cost keeping. If this is a fact, undoubtedly the reason for this condition is because they have been loaded down with numerous forms, report blanks and literature that the average man, after he had done his best to follow requirements, could see no value in, and naturally lost interest.

Illustrate Plainly the Real Value and Purpose of Cost Records

It is extremely important that those in charge of costkeeping and road work, who are interested in securing costkeeping data and better business methods by state and county officials, put the matter up to the employe in such manner that he may readily understand the value of accurate records. Show him where his own position is to be bettered if he is capable (and most men believe themselves that) by having carefully kept costs. He should have some inducement to act as an incentive to carry out instructions and these instructions should be sufficiently reasonable that he himself may see the value to himself and the county as well as to others in their enforce-

ment. When this has been done, it will be found that the man who does not become interested in these matters sufficiently to make an honest effort to improve, will be the exception and not the rule. The trouble has been largely that supervisors and others have simply been criticised for not doing this, or that or the other thing, but no one has come out and given them a definite system by which they could produce improved results which was sufficiently simple to be understood by the average person.

Field Accountants Usually Live Wires

A costkeeping system for field accounting should not be made simply for the use of experienced accountants or office men. The man who is the most valuable on construction work and who must do the detail work in connection with the gathering of costs, is frequently a man who has had very little general office experience, and, as a matter of fact, it has been observed that as a rule the man with long years spent in an office does not make as good a field construction accountant as the man who has had just enough general office experience to be fairly familiar with the rudiments of office work. For the office man, with long training at a desk, where everything is brought to him, it is difficult to develop the "go-out-and-get-it" spirit which is absolutely necessary for the field accountant to have if he makes good. The man who makes good on construction accounting must be alive and alert; have plenty of initiative, fairly well balanced judgment, and to consider no job which is for the good of the project, as beneath him.

"Spilled Dignity"

Construction work is a poor place to develop dignity and the man who goes into camp with a liberal supply, either loses a large portion of it early in the game, or eventually his position. By this is meant self importance, rather than real dignity. Dignity which comes from strength of character and knowledge is at home anywhere.

Timekeeper on a Large Construction Job

The work of costkeeping and that of timekeeping on the average construction job is so nearly related that a few remarks concerning the duties of timekeeping may not be out of place. In fact good costkeepers are developed from good timekeepers. Timekeeping is important and only good timekeepers are of any real value on a job. The other kind are worth less than nothing.

Timekeeping a Matter of Clothes?

The ideas of the inexperienced applicant in regard to the duties of timekeeper on construction work are frequently amusing and pathetic as well. His general impression seems to be that the timekeeper's duties consist largely in securing the proper kind of clothes and that his work is to saunter up and down the highway with his timebook under his arm once or twice a day, depending on the condition of the weather, and marking down an "X" whenever he finds a man employed.

The timekeeper on construction work should be a man of sufficiently broad experience to be capable of handling a large amount of detail. He should take time in the field twice a day, or as many more

times as the nature of the work demands, and he should take it at different hours each day. The men should not know the exact minute he is due. He should be in close touch with the detailed plans of the engineer or superintendent. He should have a fair knowledge of grading work and contractor's equipment and he should know every day where every piece of equipment on the job is. He should be observing and gather in his mind a large amount of detail which perhaps there may be no immediate use for, but which will sooner or later be required. He should know what every man is doing every day, and he should not pester the superintendent with unnecessary questions, but get information first hand, from his own initiative. He should take care of all incoming and outgoing mail for the men, and its prompt distribution.

Timekeeper Must Be An Allround Man

The timekeeper should be sufficiently familiar with mess operation to see that it is handled properly, and he should know enough about accounting to handle the details thoroughly.

The timekeeper, if he is made of the proper material, should be the right hand man of the superintendent or engineer, and at the same time the errand boy. He should look after the camp carefully, take means to keep the sanitary conditions good. He should know when men are sick and see that they are properly provided for. In short the timekeeper is the handy man around the camp and if his work is efficiently handled, usually there will be found a pretty well satisfied crew, if

the superintendent is equally efficient. If the camp conditions are poor, and the mess unsatisfactory, the very best of superintendents will find it extremely difficult, if not impossible, to get efficient results on that work.

The Spirit Controls

And after all has been said on organization, and all the cut and dried rules have had consideration, the final result is that the organization is a good working unit, only when the proper spirit is found throughout. The developing and nourishing of this spirit is the function of the long headed and experienced organizer. Encourage the men to speak well of each other of their own departments, and of other departments of the business of which they are a part. If they speak well they are usually "thinking" well. The beneficial effect of this attitude is certain to be felt. Such a spirit as makes the best organizations is very well set out in the few verses following. We need more of the "Fisherman's Spirit" in our every day work. Let us live while we work and help the other fellow to enjoy his work and his life by doing the little things that make life for us all worth living.

Most of Us Should Go "Fishin' " More Often

His thoughts are mostly good and clean,
 Out fishin';
A feller isn't thinkin' mean,
 Out fishin';
He doesn't knock his fellow-men
Or harbor any grudges then;
A feller's at his finest when
 Out fishin';

The rich are comrades to the poor,
 Out fishin';
All brothers of a common lure,
 Out fishin';
The urchin with the pin and string
Can chum with millionaire and king,
Vain pride is a forgotten thing—
 Out fishin';

A feller gits a chance to dream,
 Out fishin';
He learns the beauties of a stream,
 Out fishin';
An' he can wash his soul in air
That isn't foul with selfish care,
An' relish plain and simple fare—
 Out fishin';

A feller has no time fer hate,
 Out fishin';
He isn't eager to be great,
 Out fishin';
He isn't thinkin' thoughts of pelf,
Or goods stacked high upon the shelf—
But he is always just himself,
 Out fishin';

A feller's glad to be a friend,
 Out fishin';
A helpin' hand he'll always lend,
 Out fishin';
The brotherhood of rod and line,
An' sky an' stream, is always fine;
Men come real close to God's design,
 Out fishin';

A feller isn't plottin' schemes,
 Out fishin';
He's only busy with his dreams,
 Out fishin';
His livery is a coat of tan,
His creed: to do the best he can;
A feller's always mostly man,
 Out fishin'.

THE VALUE OF GOOD COST RECORDS

A Field for Competent Cost Accountants

Not Competition But Co-operation Is the Life of Trade

In an address before the Chicago Commercial Club Edward N. Hurley, Federal Trade Commissioner, January 13, 1917, is reported to have stated that less than 10 per cent of the corporations of the United States have any accurate notion of production costs and that nearly half of them had no net income whatever during the year 1914. Unintelligent price cutting to meet competition was frowned on by the commissioner who said that lower costs of products must come only from increasing efficiency of manufacture. Cost-keeping systems should be installed, he said, in all manufacturing and retailing establishments. Mr. Hurley predicted that within five years hardly a bank in the country will loan money to a merchant or manufacturer who does not present information not only regarding assets and liabilities but regarding the degree of efficiency with which he conducts his business. Wise co-operation between competing business men must follow the establishment of cost systems, said Mr. Hurley. Legitimate co-operation applied to standardization of processes and products, cost accounting and other phases of business was urged upon business as a most desirable and profitable procedure.

Cost Accounting Vital to Lumber Business

A clipping taken from the Oregon Journal, of Portland, Oregon, under the heading "Finance; Timber; Industry," reads as follows: Cost Accounting Vital. Among the necessary enlargements of co-operative endeavor in the various branches of the lumber industry may be mentioned cost accounting. The prime need is for a general knowledge among the lumber manufacturers of the actual cost of production. Until the lumber manufacturers throughout the country know more clearly, more promptly and more constantly what it is costing them to produce every item they sell, they will not have the fundamental basis for the adoption of right merchandising principles.

Accounting for Road Funds

Taxpayers who realize what a large part of their taxes are spent on roads and how poor is the average system of accounting for road funds, will be interested in the following resolution recently passed by the County Engineers' Association of the State of Washington: "Some system of cost-keeping must be devised whereby all expenditures from road funds from all sources may be classified and segregated, in order that taxpayers and road officials may be informed of details of cost of construction and maintenance of the various types of road. To this end we recommend that all vouchers for road work, before being allowed by the county commissioners, shall show details of expenditures, as to place, extent, character and classification of work, and that the county engineer be required to collect and file all such data."

CRITICISM OF A FOREIGN SCIENTIST

But little consolation is found in the fact that chaotic conditions in road construction are not confined to one state. The following clipping found its way to the writer's desk, and as it contains some pertinent statements on highway work and lack of accounting methods, is included herewith:

The Big Subject "Road Construction"

A group of road men were talking good roads the other day in a rather serious strain, and a foreign scientist, who has given quite a bit of time to the subject of highways, and particularly to America's modern attitude toward them, argued that our view point was wrong. We are not going at the good roads problem with any degree of earnest thought, and consequently we are not likely to solve our difficulties with any degree of permanency or with an intelligence that will be a thing of pride to hand down to the generations to come after us and use our pathways through the country.

Haphazard Guesswork on Road Construction

The haphazard guess work given our road construction work was driving the scientist to expressions of a very definite nature.

"You do not know how long your roads will last! You have no idea which is the best paving material for various kinds of traffic. You are led by advertisers who know how to present their wares and you have no scientific knowledge of

what you are doing and why you are doing it.” That is what the foreign scientist thought and said.

In our country we would know. We would pave one mile with asphalt, one with concrete, one with brick and another with wood blocks. We would spend years if necessary in sending traffic at a given rate of speed over the roadbed, knowing exactly the number of tons used. We would manufacture equipment for it, and when the experiments were concluded there would be data to defy the most punctilious. There would be exact formulas for every sort of traffic, and by measuring the traffic on a road to be built, the proper kind of material could be chosen and there would be a certain knowledge of just how long it should last.

Lack of Proper Accounting Methods Very Apparent

“If the actual materials to be used were the only point of indecision the road problem would not present such a grave surface as it does. As a matter of fact the finances of road work are so uncertainly handled, and the system of accounting as yet so badly managed that therein lies a serious tale.

“For instance, a certain State Highway Commission has had trouble ascertaining what the counties in the state have been spending because there is no complete system of accounts. One county reported collecting \$16,000.00 for road work, but after investigation the commission found that \$32,500.00 had been collected. Another county reported the collection of \$3200.00 and

investigation showed a total of \$19,600.00. And the discrepancies were not due to a desire to hide the true state of affairs, but merely to bad accounting."

Better Methods Certain to Develop

The answer to the foreign scientists criticism is that the necessity for good roads due to general automobile travel, grew too fast. There was no intermediate period for thoughtful scientific consideration; there was no period of adolescence. So America must do the best it can. We will never give it the Scientist's consideration, but we will better our grip on the problem a thousand fold after a time.

America's 100 per cent Men

There is every reason why we should. Some of the country's most able men are figuring the tangles out of the snarl, and behind it are THE BEST BOOSTERS IN THE WORLD—AMERICAN BUSINESS MEN.

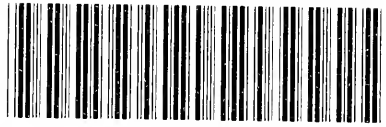
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